

**MICRO-MAINFRAME PROCESSING SERVICES
AND TURNKEY SYSTEMS MARKET OPPORTUNITIES**

INPUT

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Planning Services For Management

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MICRO-MAINFRAME PROCESSING SERVICES AND TURNKEY SYSTEMS MARKET OPPORTUNITIES

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I INTRODUCTION

I INTRODUCTION

A. BACKGROUND

- The micro-mainframe issue is one that scored high in INPUT's 1983 client poll. Since then, interest has continued to climb, assisted by a barrage of vendor announcements.
- However, the profusion of announcements of products (and some pseudo-products) has made it in some ways more difficult to identify and understand the real issues. Most current vendor products and corporate plans are preliminary, where they are not primitive.
- INPUT believes that the group of issues united under the banner "micro-mainframe" could produce a discontinuity in data processing at least as large as that produced by the introduction of the System/360. With this view, the micro-mainframe question becomes much more than a question of, for example, screen versus file transfer.
- INPUT intends that the studies contained in this series of reports (see section C of this chapter) be useful planning documents over a three- to five-year planning horizon, although the reports do not neglect current issues or technical detail.

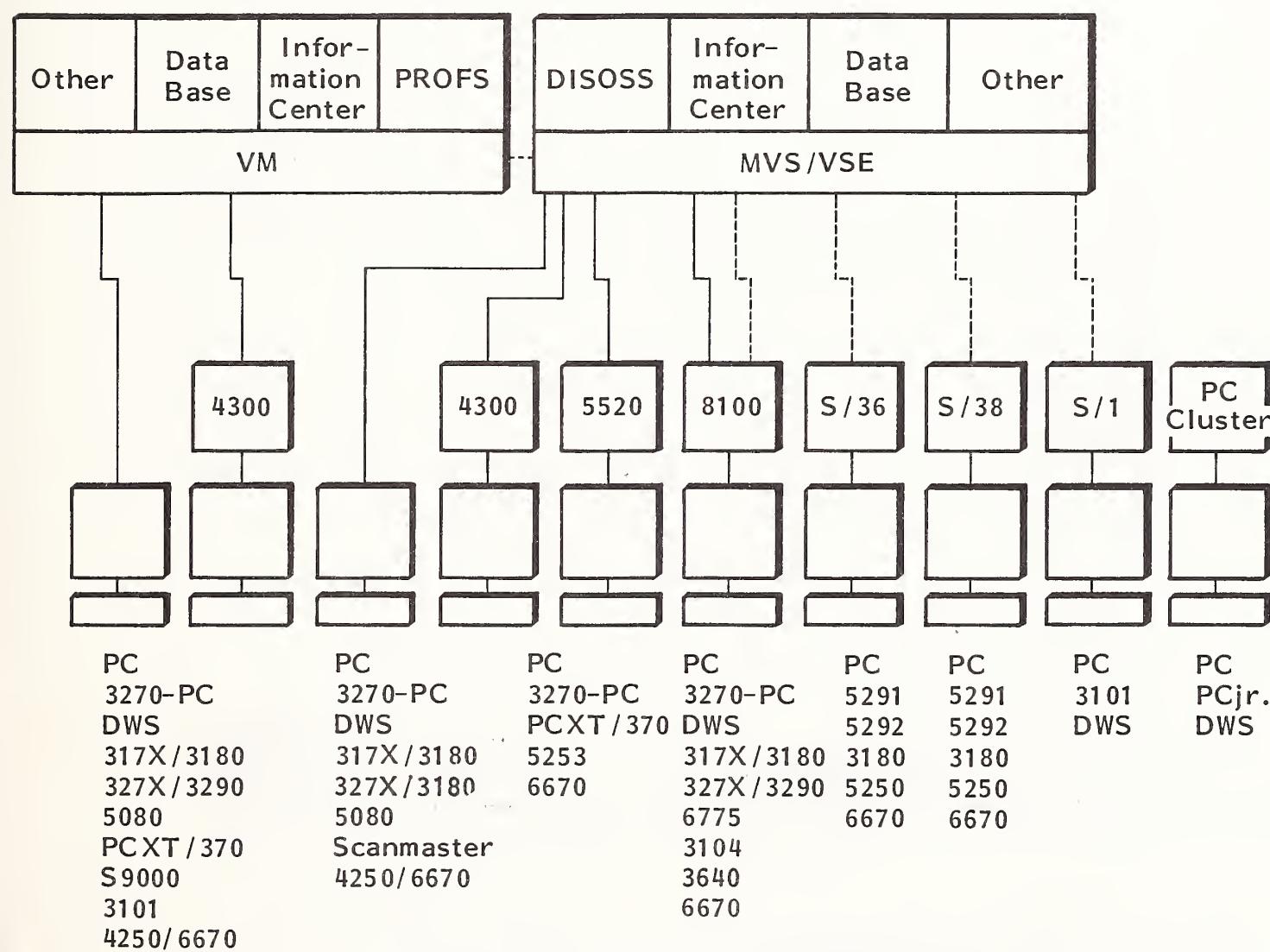
- The study generally assumes that the micro-mainframe world is an IBM world (or an IBM-compatible world, which in many ways is the same thing). This has obviously been true for some time at the mainframe level, and the issue will not be belabored here.
 - At the micro level this assumption is still somewhat debatable; for example, Apple's Macintosh and ATT's recently announced computer series may still provide a basis for corporate micro-mainframe strategies. However, two key points should be made:
 - . IBM's current interconnect strategy will provide an underlying environment for Information Systems (IS), end users, and vendors, as shown in Exhibit I-1.
 - . Equally important is the view held by IS departments. The non-IBM-compatible share of corporate micros is expected by IS management to be very low compared to IBM and IBM-compatibles, as shown in Exhibit I-2.
 - This does not mean that there is not and will not be a place for innovative micro hardware in large enterprises. However, from the standpoint of micro-mainframe connectivity, such devices will have to look like comparable IBM-compatible equipment in order to be easily used and accepted—or at least they must be transparent to IBM networks.

B. METHODOLOGY

- The research for this report was conducted in parallel with that for three related reports (see next section). A large project team spent over four months researching and analyzing information in this rapidly changing area. The research consisted of the following major activities:

EXHIBIT I-1

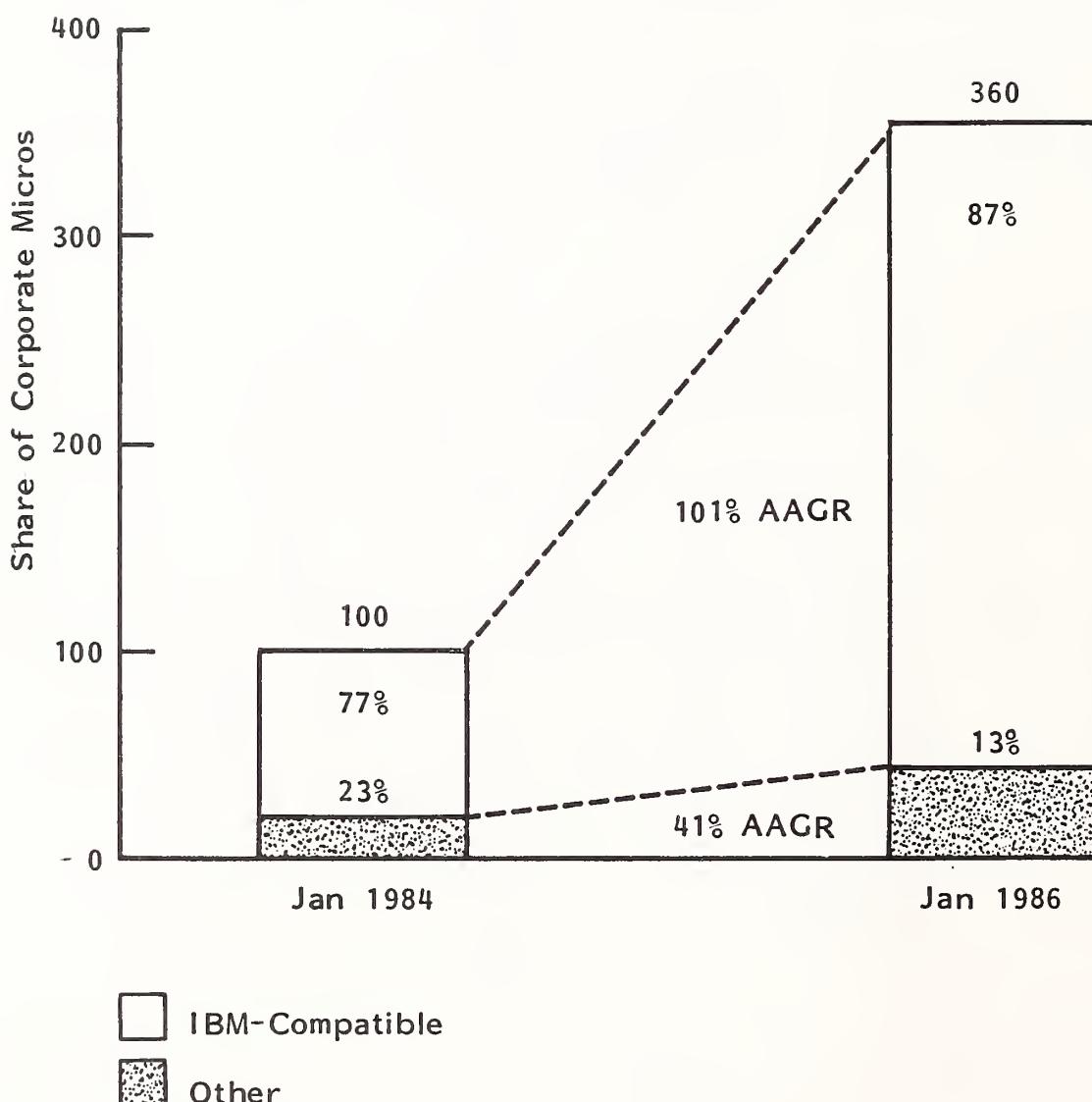
IBM'S PC COMMUNICATIONS FRAMEWORK



Source: IBM

EXHIBIT I-2

CORPORATE MICRO GROWTH, 1984-1986



- Client interviews.
- Corporate interviews, case studies, and consulting.
- Vendor interviews, case studies, and consulting.
- Product and service analyses.

I. CLIENT INTERVIEWS

- INPUT clients were sampled in December and January to ascertain their areas of special interest and to learn of their experiences, problems, and needs.

2. CORPORATE INTERVIEWS

- Seventy-eight structured interviews were conducted with IS management at large companies in February and March of 1984.
 - The questionnaire used is in Appendix A.
 - Company sizes and industries are shown in Appendix B.
- These interviews were unusual, owing to the fact that they were much longer than typical interviews (i.e., averaging 45 minutes to over an hour); respondents were highly motivated and forthcoming.
- In addition, INPUT had the opportunity to review over 20 companies in depth. Some of the experiences of these companies are described in detail; other information was used to inform our analysis and recommendations.
- In the past nine months, INPUT has conducted a number of consulting studies that bear on the micro-mainframe issue. Five of these studies have specific-

ally addressed micro-mainframe issues from the corporate standpoint, and the knowledge gained is relayed in this report.

3. VENDOR INTERVIEWS

- Structured interviews were conducted with vendor personnel from 20 companies in February and March. The questionnaire used is shown in Appendix C.
- In addition, more than 30 other people from vendor organizations were interviewed in particular issue areas.
- Vendors, too, were highly interested in the topic and were quite forthcoming. A number of interviews were multihour in length. Those interviewed ranged from senior technical staff to company presidents. The companies included small, innovative software firms and very large hardware companies.
- INPUT's recent consulting studies have included four that address vendor micro-mainframe issues. Although no proprietary information from these engagements was used directly for these public studies, these engagements provided INPUT with an in-depth sensitivity to vendor requirements.

4. PRODUCT AND SERVICE ANALYSIS

- INPUT has collected and analyzed information on several hundred products and services in the micro-mainframe area.
- Unfortunately, some of the information obtained at the beginning of the study is already obsolete. INPUT estimates that micro-mainframe technical and product information has a half-life of about six months. Several products will probably be formally available a short time after the release of this report. The rate of new product introduction has been very high, and INPUT expects it to continue; for example, there are high-speed micro-mainframe links from LAN vendors, and Cullinet has a micro-mainframe intelligent link.

- In general, micro-mainframe products are evolving very quickly. Consequently, extensive detailed product comparisons will soon be out of date.
- Therefore, INPUT has used specific products largely to illustrate more basic issues. INPUT's goal has been to make this a study that would require only marginal updating for it to remain a useful planning tool a year from now.
- Some of the survey's quantitative results would have appeared surprising, even dubious, to the INPUT micro-mainframe project team had it not been for other micro-mainframe-related studies that INPUT has conducted in the past six months.
 - Several of these other studies included in-depth (i.e., one to two hours), face-to-face interviews conducted with:
 - Over 50 IS managers and planners.
 - Over 25 people in end-user management (up to the executive vice president level in multibillion-dollar organizations).
 - These other studies are very supportive of the projections contained here and, from the standpoint of end-user motivations and plans, may even go beyond some of the findings here.
- Although the companies interviewed for this report were selected randomly, in a sense the respondents were not. But respondent self-selection has worked to the study's benefit, in INPUT's opinion.
 - Respondents were in IS executive or planning management, and the job titles have the usual distribution for this type of study.

- However, in arranging interviews, INPUT was usually (and properly) directed to the person that was most knowledgeable on micro-mainframe issues in that organization.
- This person was almost always ahead of the rest of the organization in information and, more importantly, in insight. These respondents often know where their IS organizations are going before most others in the organization have even begun to consider the issues.
- Fortunately, this brings the results of the survey much more in synch with end-user directions and motivation. (For obvious reasons, it is very important to understand where end users are going.)

C. OTHER RELATED INPUT REPORTS

- This report is being issued in conjunction with three other reports in the micro-mainframe series of reports, as shown in Exhibit I-3. These reports are:
 - End-User Micro-Mainframe Needs
 - . This report is part of the Information System Program (ISP), utilized by IS management.
 - . This study addresses the current and future impact that the micro-mainframe phenomenon will have on end users and, in turn, on IS departments.
 - . The report focuses on developing opportunities and problem areas and on determining how IS can meet them.

EXHIBIT I-3

MICRO-MAINFRAME REPORT RELATIONSHIPS

Program:



Audience:

IS Managers
and Planners



Information
Service Vendors

Reports:

End-User
Issues

Personal Computer
Impact

Telecommunications
Planning

Remote Processing and
Turnkey Strategies

Close Relationship

Provides Deeper
Understanding

- Micro-Mainframe: Personal Computer Market Opportunities

- This report is part of the Market Analysis and Planning Service (MAPS) that is utilized by information service vendors.
- The study addresses and analyzes micro-mainframe developments and the impact they will have on the personal computer industry.
- The report provides market forecasts and strategies for taking advantage of coming structural changes.

- Micro-Mainframe: Telecommunications

- This report is part of the Information System Program (ISP) utilized by IS management.
- This study addresses current developments in micro-mainframe communications as well as future trends.
- The micro promises to have a significant impact on communications. This report analyzes positive and negative effects of anticipated changes and provides strategies for dealing with them.
- These four reports share a common core of concepts, and data is presented to readers in the following way:
 - The reports avoid (when possible) referring readers to pertinent sections of other reports, in order to make each report stand on its own.

- Data analyses or concepts that are discussed in more detail in other reports are summarized.
- Detailed information is included in appendices.
- Other related INPUT reports include:
 - Selecting User Friendly Operating Systems for Personal Computers, June 1983.
 - Executive Workstation Acceptance: Problems and Outlook, May 1984.
 - Organizing the Information Center, August 1983.
 - Supporting Personal Computer Software, August 1983.
 - Data Administration: Experiences and Outlook, June 1984.
 - Personal Computers in the I.S. Strategy, December 1982.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This executive summary is designed in a presentation format in order to:
 - Help the busy reader quickly review key research findings.
 - Provide an executive presentation and script that facilitates group communications.
- The key points of the entire report are summarized in Exhibits II-1 through II-7. On the left-hand page facing each exhibit is a script explaining the exhibit's contents.

A. NEW ENVIRONMENT = NEW OPPORTUNITY

- The standalone micro has already stimulated new computer user and vendor business opportunities. RCS and turnkey vendors have dined lightly at this feast.
- However, the emerging micro-mainframe environment represents even larger opportunities for RCS and turnkey vendors. If RCS and turnkey vendors do not attempt to enter these new areas, their growth and profitability will almost certainly be significantly hurt.
- A new software environment is emerging, one of "shared functionality" for data and processing between both host computers and microcomputers.
- The need for transparent connectivity between diverse, complex hardware and software architectures is becoming increasingly evident. Many questions still remain unanswered, but RCS firms have considerable experience in filling connectivity gaps.
- Tailored industry and functionally oriented applications will become increasingly important. These are areas of strength for RCS and turnkey firms.
- The micro-mainframe phenomenon is being driven largely by end users' needs and pressures. Again, one of the strengths of both RCS and turnkey firms is their proven ability to sell to and work with end users. However, because of the mainframe connection, these vendors will have to relearn how to deal with information system departments as well.

NEW ENVIRONMENT = NEW OPPORTUNITY

New Software Environment

+

Connectivity

+

Industry Applications

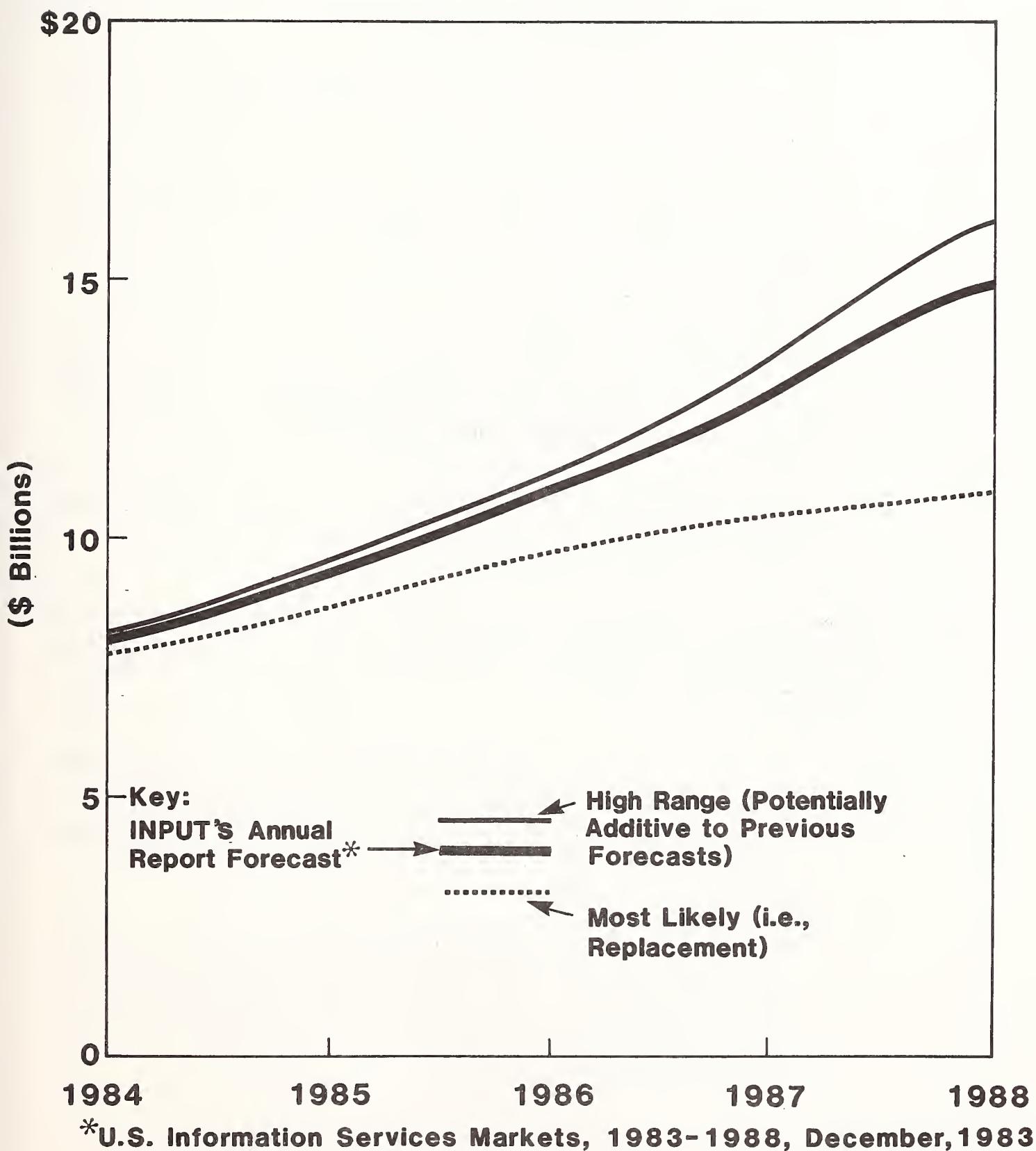
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User Needs

B. MICRO-MAINFRAME OPPORTUNITIES COULD REJUVENATE RCS

- The RCS industry has been going through a period of slow growth recently. Standalone micros have contributed to RCS problems.
- In its evolving micro-mainframe form the micro could help to rejuvenate the RCS sector. The following types of micro-mainframe RCS products, in order of importance, could help to bring this about:
 - Data base information supplied to micros (as computers, not as terminals).
 - Increased data communications, as part of micro-mainframe applications and via electronic mail.
 - RCS firms as intermediaries between corporate micros (within the same enterprise and between enterprises).
- The last area is the one that represents the best opportunity for RCS firms since it is a new solution to an old problem, promises dramatic growth if the right targets are selected, and is one where RCS firms have advantages over potential competitors. Like all opportunities, it is not without risk, however.

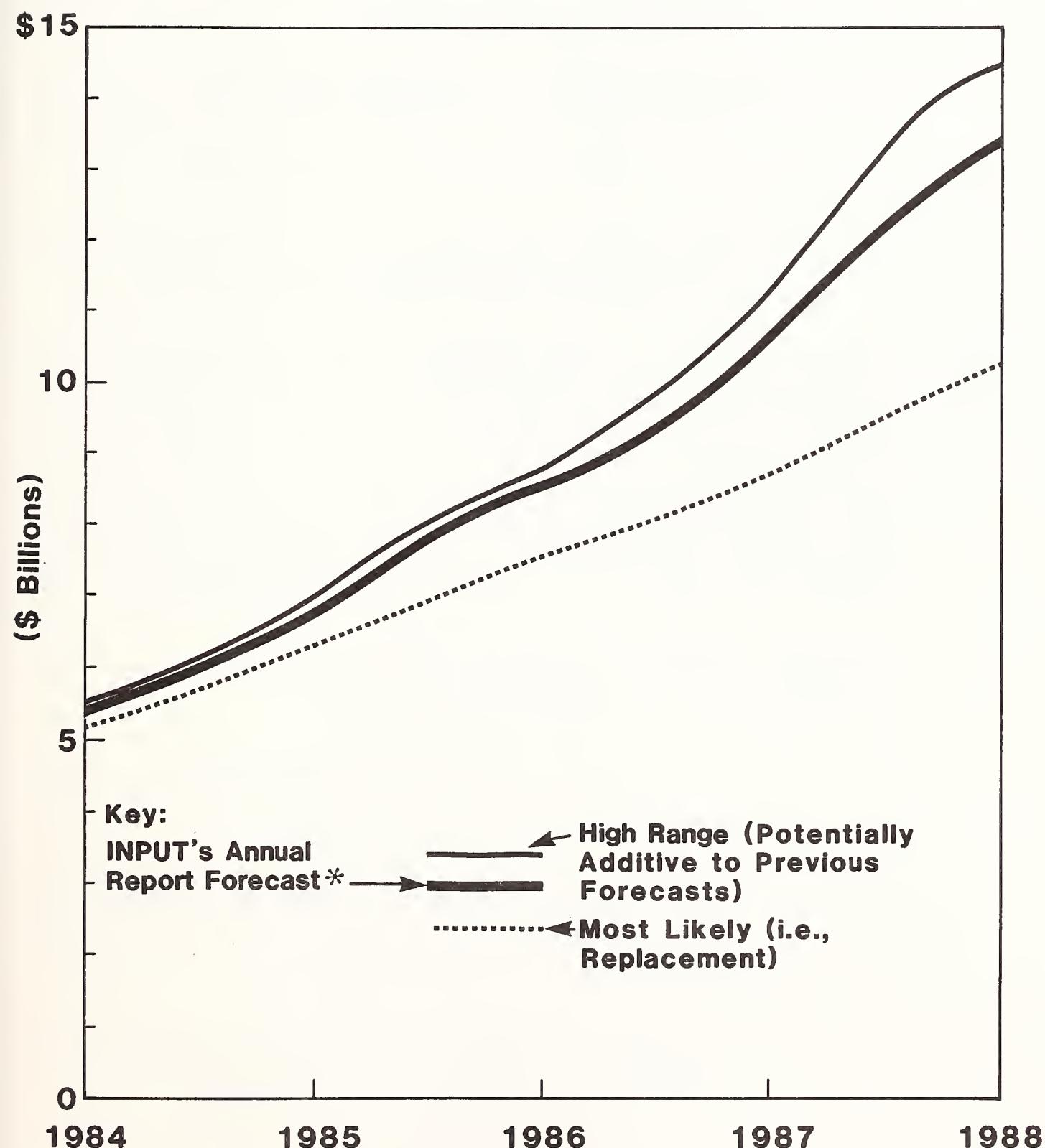
MICRO-MAINFRAME OPPORTUNITIES COULD REJUVENATE RCS



C. MICRO-MAINFRAME: SIGNIFICANT IMPACT ON TURNKEY SYSTEMS

- The turnkey sector is similar to RCS in that it is also under pressure from micros; in this case the pressure comes from:
 - Low-cost micros, rather than minis, as the vehicles for turnkey systems; and
 - Vertical-market micro software sold in competition with traditional turnkey solutions.
- The turnkey business will be changing. As a result:
 - Less added value will come from configuring hardware, as IBM-compatibility makes micro hardware increasingly similar.
 - There will be more added value from professional services, where turnkey vendors focus on the corporate market.
- Pressures on the traditional turnkey business will continue. Balancing this will be two higher end opportunities opening up as a result of micro-mainframe capabilities and user needs:
 - One opportunity is for high-end turnkeys with greatly increased flexibility, aimed at functional niches within large corporations. The tailoring required will open up new opportunities for professional services.
 - Further in the future is perhaps the largest opportunity of all: distributed turnkey systems. These would combine local turnkey functions with distributed links to host applications. Distributed turnkey systems would fill a key gap in user needs.

MICRO-MAINFRAME: SIGNIFICANT IMPACT ON TURNKEY SYSTEMS



*U.S. Information Services Markets, 1983-1988, December, 1983

D. CRITICAL ISSUE: CUSTOMER AWARENESS GAP

- From one standpoint, vendors are well placed to do business in the micro-mainframe area:
 - Most corporations are doing something in the micro-mainframe area now. Two-thirds are relying on vendors for current systems and over four-fifths plan to work with vendors in their new systems.
 - Corporations are very much aware of their lack of knowledge and skills and have not been disappointed in vendor assistance received.
- However, vendors have a serious problem in that corporations have a very unclear view as to the type and extent of assistance they can expect from vendors generally (that is, unfamiliar vendors). This may seem somewhat surprising at first, given the amount of publicity this area has attracted and the plethora of vendor announcements. However, the very bulk of these announcements has tended to be self-defeating. In addition, many are perceived, often correctly, as being announcements of phantom products.
- RCS and turnkey firms are perceived by corporations as having even less to offer than other types of vendors.
 - This is partly due to the general inactivity of RCS and turnkey vendors in the micro-mainframe area.
 - There is also the problem that RCS and turnkey vendors have, at the least, avoided working with information system departments in the past. This has now come back to haunt them.
 - Solving this perception problem will have to be a high priority for RCS and turnkey firms that wish to be successful in this area.

CRITICAL ISSUE: CUSTOMER AWARENESS GAP

- **Vendor Use:**
 - High Now
 - Increasing
- **IS/Users: Lack Skills**
- **But: Few Vendor Types Stand Out**

E. SPECIAL VENDOR STRATEGIES ARE NEEDED

- The key for success in this emerging market is adaptability. The market is still in the early take-off stage:
 - There are many holes in the technology. Current products are very diverse and there are no obvious winners.
 - End users often know what they want but find it hard to express their needs in a technologically coherent fashion. Many information systems managers are still ambiguous in their attitudes toward micro-mainframe applications.
 - Consequently, vendors should be prepared to enter--and exit--new opportunity areas quickly.
- Although adaptability and speed are required, so is caution needed in dealing with new technology. Some things that users want (interactive distributed systems, for example) are not feasible now. Other areas, such as data base synchronization and network control, will be difficult to achieve, especially with a lack of customer interest.
- One of the most important strategic issues is that, although software vendors offer many products, many needed products do not exist and will not for some time to come. Consequently, customers (including information system departments) will be looking for solutions from diverse sources.
- Since RCS and turnkey firms are not what information systems departments will initially consider, these vendors will have to take special efforts to stress their capabilities. Vendors will have to stress these capabilities after, not before these capabilities exist.

SPECIAL VENDOR STRATEGIES ARE NEEDED

- **Adaptability**
- **Technological Caution**
- **Exploit Software Gap**
- **Stress Real Capabilities**

F. RCS STRATEGY: REDIRECTION

- In addition to the general strategies just referred to, RCS firms need to redirect their strategies in specific ways. The least difficult change will be to reorient existing strengths, i.e.:
 - RCS firms need to capitalize on their understanding of application and end-user needs, as well as established sales contacts.
 - RCS firms need a solution orientation. A "can do" attitude will be especially important in the early years of micro-mainframe systems, when solutions will often be less than elegant.
 - Not to be overlooked is the wealth of connectivity experience that RCS firms have, including early work in tying minis and micros into their own networks.
- Similarly, recent efforts to find vertical market niches will have to be redoubled, but with a micro-mainframe twist. This will take strong nerves at times since, in extreme situations, it could mean making additional investments in order to sell fewer vendor-controlled host cycles.
- The biggest challenge will come in viewing the information system department as a customer or a partner rather than as a barrier. However, in most cases this task will be unavoidable, since the corporate data base and central processor control will be the keystone to micro-mainframe applications.
- An optional strategy for some RCS vendors will be to develop partnerships with software vendors. In many cases each will need the product and/or marketing experience of the other.

RCS STRATEGY: REDIRECTION

- **Reorient Skills: Build on:**
 - End-User Ties/Understanding
 - Solution Orientation
 - Connectivity Experience
- **Enhance Vertical Market Focus**
- **Tame the IS “Enemy”**
- **Find Software Partners**

G. TURNKEY STRATEGY: MOVE UPMARKET

- In many respects turnkey vendors already have many of the strengths required to succeed in the micro-mainframe market:
 - Vertical markets have always been the focal point of turnkey vendors.
 - Software has been and will continue to be the key added-value component of turnkey systems.
 - Turnkey systems will need to become even more flexible if they are to move upscale to meet complex corporate needs.
- The micro is a threat to low-end business, but not to high-end business.
 - Flexible, high-value-added systems will be valued more because of the software, rather than the hardware, component.
 - In the short term (i.e., the next two to three years), relatively simple host interfaces will suffice for mainframe-turnkey connectivity.
- Long term, turnkey vendors should plan to offer "distributed turnkeys" where much closer mainframe connections would be required. To support these future products, turnkey firms should begin planning in two directions:
 - To understand what evolving user needs will require.
 - To understand the technical requirements for such products. Turnkey vendors should track technical developments closely and take advantage of licensing opportunities wherever possible.

TURNKEY STRATEGY: MOVE UPMARKET

- **Build on Strengths**
 - **Vertical Markets**
 - **Software**
 - **Flexibility**
- **Micro as Opportunity, Not Threat**
 - **Trade Up, Not Down**
 - **Short-Term: Simple Host Interfaces**
- **Longer Term: Connectivity Expertise**

III MICRO-MAINFRAME: A NEW KIND OF MARKET

III MICRO-MAINFRAME: A NEW KIND OF MARKET

- The micro-mainframe (M-M) phenomenon represents a new kind of market and market opportunity for all vendors.
 - This is especially important to RCS and turnkey vendors, since the micro itself has had other, generally negative, effects on their business.
 - This chapter will briefly define M-M technical characteristics, forecast the impact of M-M on the growth of the RCS and turnkey sectors, and summarize corporate M-M-related connectivity plans.

A. MICRO-MAINFRAME CHARACTERISTICS

- One of the key findings from INPUT's research is that most corporate (and vendor) respondents saw the essence of M-M systems as being the "shared functionality" between the mainframe and the micro. These will not be "super terminals."
 - Data is shared between the micro and mainframe.
 - Application logic is similarly shared between the host and the micro.

- This sharing concept is strongly reminiscent of the "distributed data processing" (DDP) concepts of the 1970s, but, unlike DDP, the economics of M-M systems are on much firmer ground.
 - This is not to say there are not problems associated with M-M systems. These are discussed at length in other volumes of this series and will only be noted with regard to:
 - . Data base linkage and control.
 - . Backup and security.
 - . System design.
 - . Network management.
- A special problem is the design and implementation of truly interactive M-M systems. The technical problems are significant and may not be solved for years. However, two-thirds of corporate respondents see interactive M-M systems as playing a significant role, as shown in Exhibit III-1.
 - Vendors as a group are much less convinced of the imminence of interactive M-M systems (and rightly so, in INPUT's opinion).
 - Fortunately, frequently updated on-line batch M-M applications can often meet the functional needs of interactivity in an M-M environment.
 - Vendors will be challenged to devise products that satisfy interactive desires without being truly interactive.
- The concept of shared functionality is a very strong one. Three-quarters of corporate respondents saw their organizations implementing M-M applications of this type, as seen in Exhibit III-2.

EXHIBIT III-1

TYPES OF MICRO-MAINFRAME LINKAGES FORESEEN

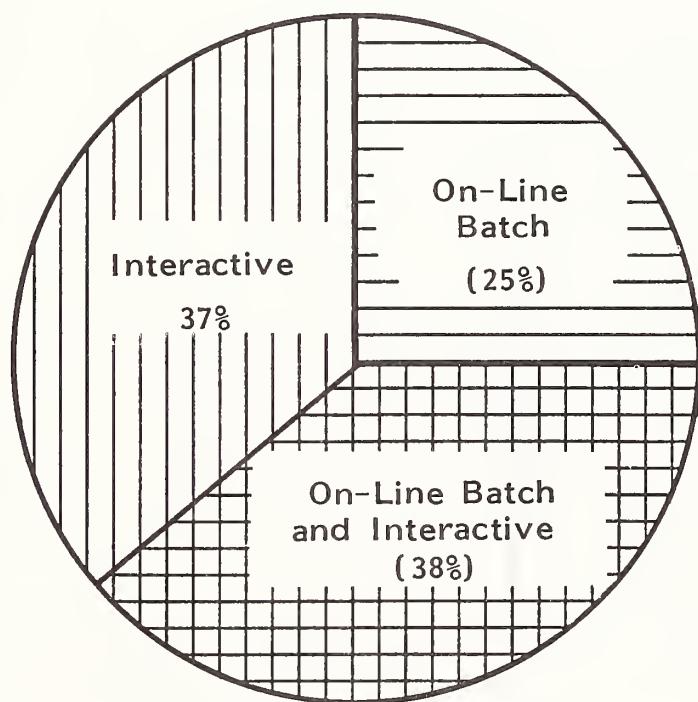
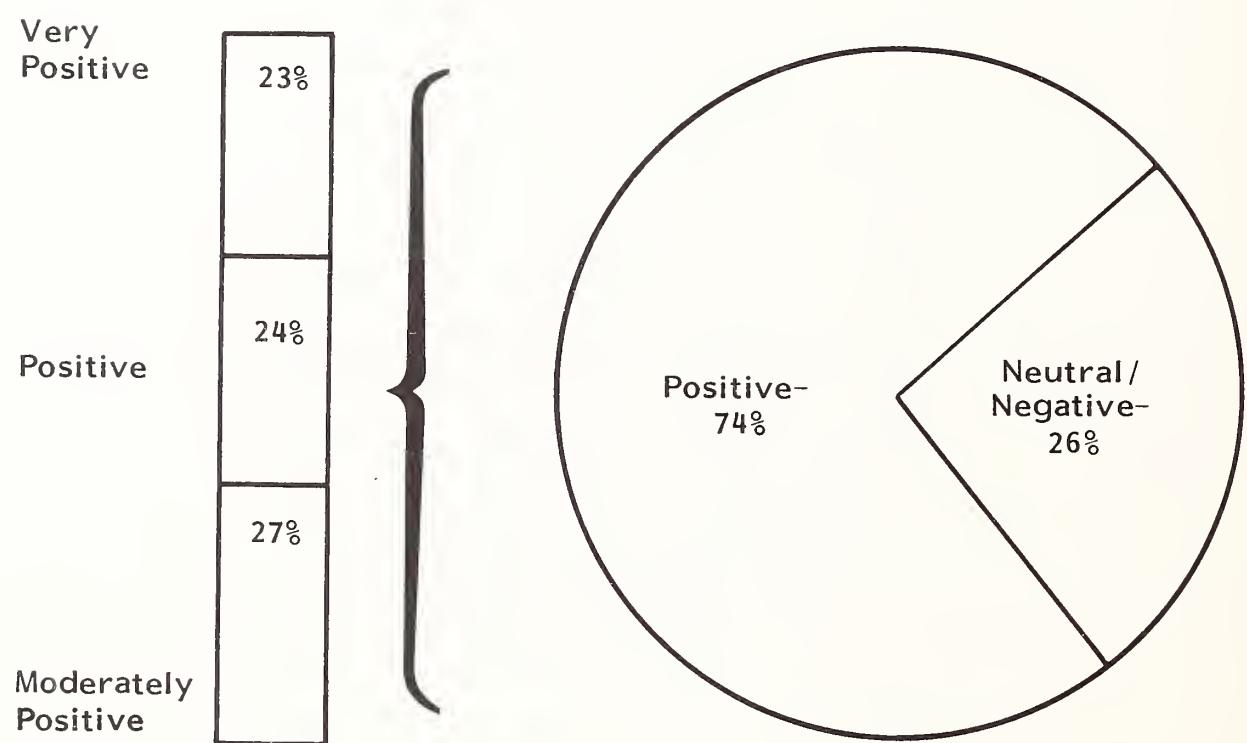


EXHIBIT III-2

EXPECTATION OF EXTENSIVE
HOST-MICRO SHARED APPLICATION FUNCTIONALITY



- One-quarter were very strongly supportive of such applications.
- Corporate respondents in general were very optimistic (in INPUT's view, probably overly optimistic) concerning their organizations' ability to implement many such M-M applications in coming years. INPUT has been conservative in using such expressed corporate intentions for forecasting purposes.
- INPUT's observation, confirmed by many Information System (IS) respondents is that much of the M-M impetus comes directly or indirectly from end users.
 - End users like the concept of having more local control over their computer resources.
 - Enough computing power has been in end users' hands already to give them confidence (rightly or wrongly) that this is feasible.
 - The multiyear backlogs for conventional IS applications are additional, negative incentives.
 - For further analysis, see the INPUT report End-User Micro-Mainframe Needs, July 1984.

B. MICRO-MAINFRAME IMPACT AND FORECAST

- From a vendor's standpoint, there will be two kinds of impact:
 - Initially, the share of any processing mode's revenue attributable to M-M products and services will be quite small but will grow to a sizable share in several years. Details are in Exhibits III-3, III-4, and III-5.

EXHIBIT III-3

MICRO-MAINFRAME IMPACT ON REMOTE COMPUTING SERVICES,
 1984-1988
 (\$ BILLIONS)

YEAR	TOTAL MODE FORECAST(a)	MICRO-MAINFRAME IMPACT		
		LOW	MIDPOINT	HIGH(b)
1984	\$ 8.1	\$ 0.2	\$ 0.3	\$0.4
1985	9.4	0.4	0.7	0.9
1986	11.0	1.0	1.3	1.6
1987	12.8	1.7	2.4	3.1
1988	14.9	2.9	4.1	5.3

Note: (a) = Total information services forecast for this mode from INPUT's U.S. Information Services Markets, 1983-1988
 (b) = Difference between "midpoint" and "high" is potentially additive; "low" and "midpoint" are replacements for non-micro-mainframe products and services

EXHIBIT III-4

MICRO-MAINFRAME IMPACT ON INTEGRATED SYSTEMS,
 1984-1988
 (\$ BILLIONS)

YEAR	TOTAL MODE FORECAST(a)	MICRO-MAINFRAME IMPACT		
		LOW	MIDPOINT	HIGH(b)
1984	\$ 5.4	\$ 0.1	\$ 0.2	\$ 0.3
1985	6.8	0.3	0.5	0.7
1986	8.6	0.8	1.0	1.2
1987	10.7	1.4	2.0	2.6
1988	13.4	2.6	3.7	4.8

Note: (a) = Total information services forecast for this mode from INPUT's U.S. Information Services Markets, 1983-1988

(b) = Difference between "midpoint" and "high" is potentially additive; "low" and "midpoint" are replacements for non-micro-mainframe products and services

EXHIBIT III-5

MICRO-MAINFRAME IMPACT ON PROFESSIONAL SERVICES
1984-1988

YEAR	TOTAL MODE FORECAST (a)	MICRO-MAINFRAME IMPACT (\$ Billions)		
		LOW	MIDPOINT	HIGH(b)
1984	\$ 8.1	\$0.2	\$0.3	\$0.4
1985	9.5	0.4	0.7	0.9
1986	11.2	1.0	1.3	1.6
1987	13.3	1.7	2.5	3.2
1988	15.7	3.0	4.3	5.6

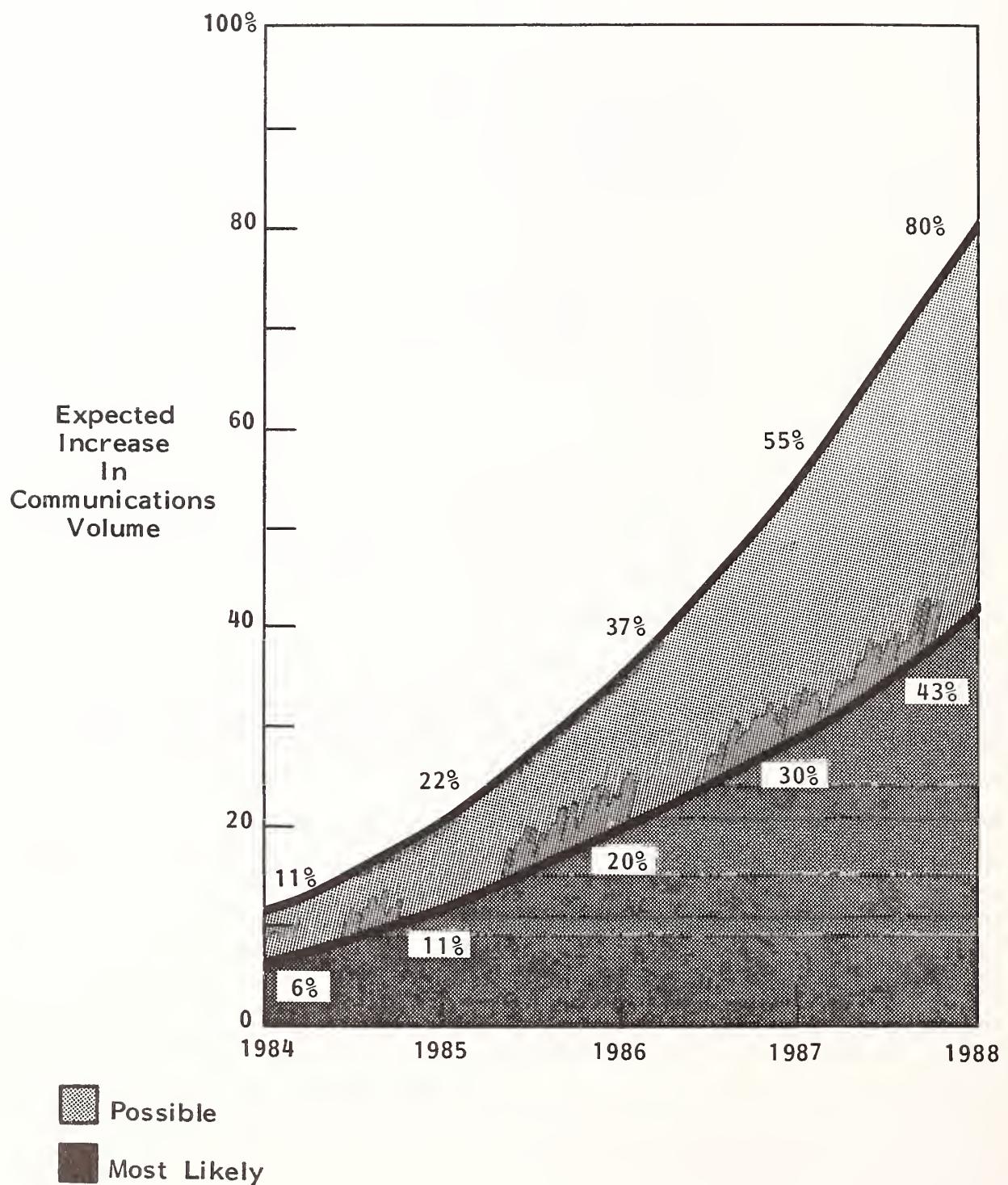
Note: (a) = Total information services forecast for this mode from INPUT's U.S. Information Services Markets, 1983-1988

(b) = Difference between "midpoint" and "high" is potentially additive; "low" and "midpoint" are replacements for non-micro-mainframe products and services

- While some of the M-M growth may involve "new money" for a delivery mode as a whole (and certainly this will be so for individual firms), much of the M-M growth will replace non-M-M products and services previously forecast.
 - For some product areas, like software products, these changes will be relatively moderate; at most they will involve replacing one product with a similar product, or having the newest product generation be M-M.
 - The M-M impact on RCS products, and to a lesser extent on turnkey vendors, will be much greater: product changes will be significant and the ways that the business is organized may also change.
 - However, these changes, representing new product opportunities should be welcomed by RCS and turnkey firms, not least because of the impact that micros and other developments have already had on their business.
- Of particular interest to those RCS firms in the communications business is the expected impact of M-M applications on data communications.
 - By 1988, corporate respondents expect to see their previous data communications estimates increase by between 40% and 80% due to the impact of M-M applications. Details are in Exhibit III-6. This growth is due to the cumulative effect of:
 - The growing number of micros.
 - Increased physical M-M connections.

EXHIBIT III-6

INCREASE IN DATA COMMUNICATIONS CAUSED BY
MICRO-MAINFRAME APPLICATIONS, 1984-1988



- - Increased M-M applications.
 - More intense use of micros in a M-M environment.
- A special kind of communication opportunity is represented by the increased use of electronic mail (EMS) that will be a fallout of M-M connectivity. On the average, corporations expect their EMS use to increase by 50% as a result of M-M connectivity. Details are in Exhibit III-7.
 - Large companies' expected increases are somewhat above average and those companies planning to use RCS firms' services as part of their general M-M implementation are far above average. (Unfortunately, as discussed further in Chapter VI, most corporations do not presently have intentions of using an RCS firm for M-M implementation.)
 - However, EMS services could be one method for RCS firms to get an initial part of the M-M business. This is especially true, given the significant increase expected in EMS use overall, especially in larger companies. The data is in Exhibit III-8.
- The most significant communications-related M-M opportunity, however, lies in the implementation of M-M applications. This topic is analyzed in depth in Chapter IV.
- All of the forecasts in the chapter are expressed in ranges, from the possible to the most likely. Because this is such an early point in the M-M life cycle there are many new developments that could accelerate or decelerate M-M growth. Such factors are:
 - The rate of new product availability (hardware/software).
 - Publicity on implementation successes and failures.

EXHIBIT III-7

PROPORTION OF INCREASED ELECTRONIC MAIL USE
ATTRIBUTABLE TO MICROS

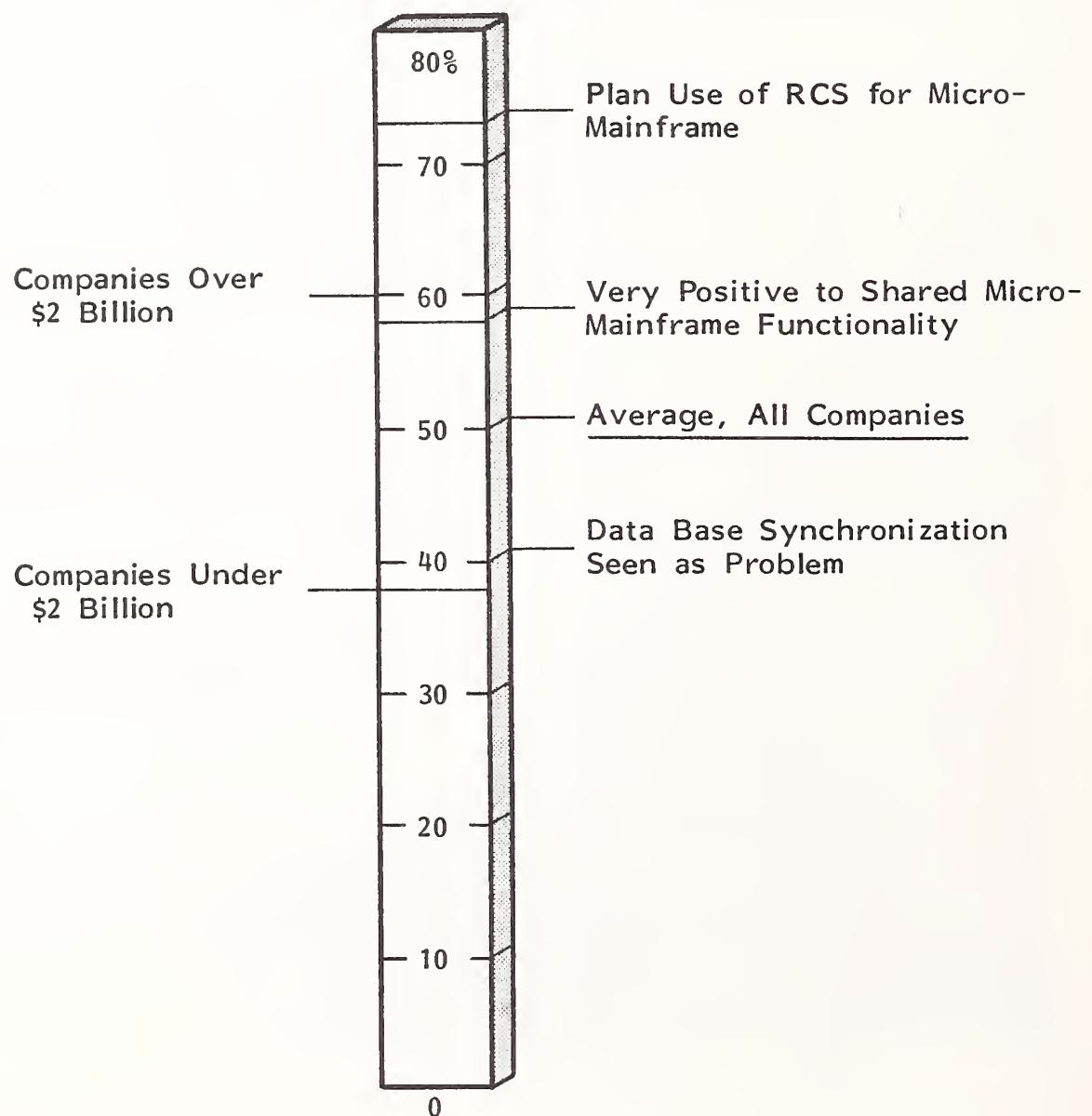
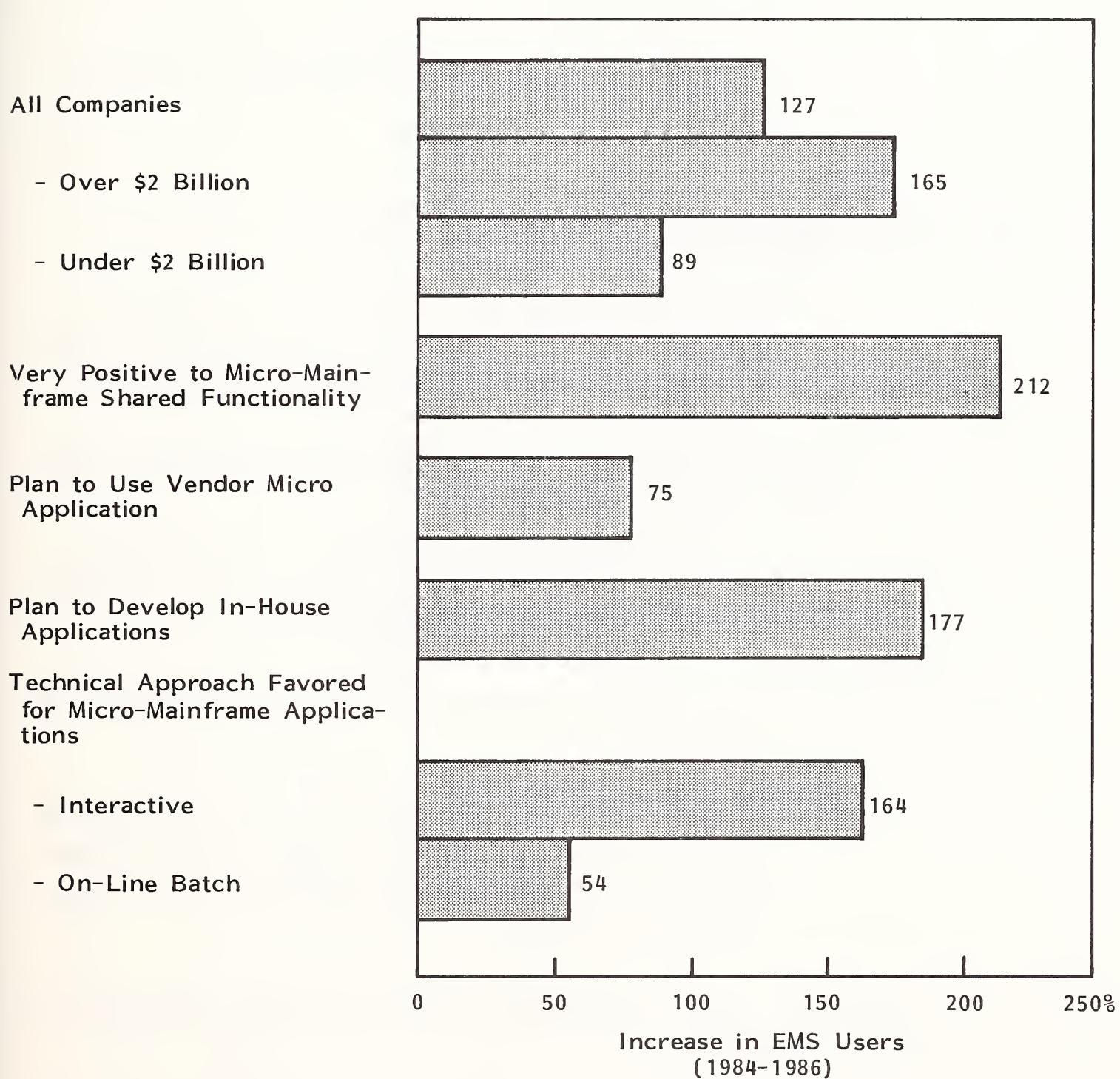


EXHIBIT III-8

EMS USERS' EXPECTED TWO-YEAR INCREASE:
SELECTED GROUPS



- IS acceptance and support.
- Vendor competition.
- Innovative M-M solutions.
- INPUT will continue to track these developments and adjust its forecasts as new information becomes available.

C. CORPORATE CONNECTIVITY PLANS

- There will be significant opportunities for vendors offering standalone micro applications and linked applications (to other micros as well as to hosts).
 - Exhibits III-9 and III-10 show a high propensity to use micros in both modes.
 - Interestingly, the insurance industry is more likely to use micros generally and the banking industry is somewhat less likely.
 - This is probably related to the increasing centralization of banking applications.
 - The insurance industry data may be surprising to some, given the industry's historical predilection to large, host-based systems. However, the micro is beginning to affect all sectors. For more analysis, see Chapter V.
- Corporations expect a considerable increase in intermicro connectivity, as shown in Exhibit III-11.

EXHIBIT III-9

PROPENSITY TO USE MICROS IN
STANDALONE APPLICATIONS, BY INDUSTRY

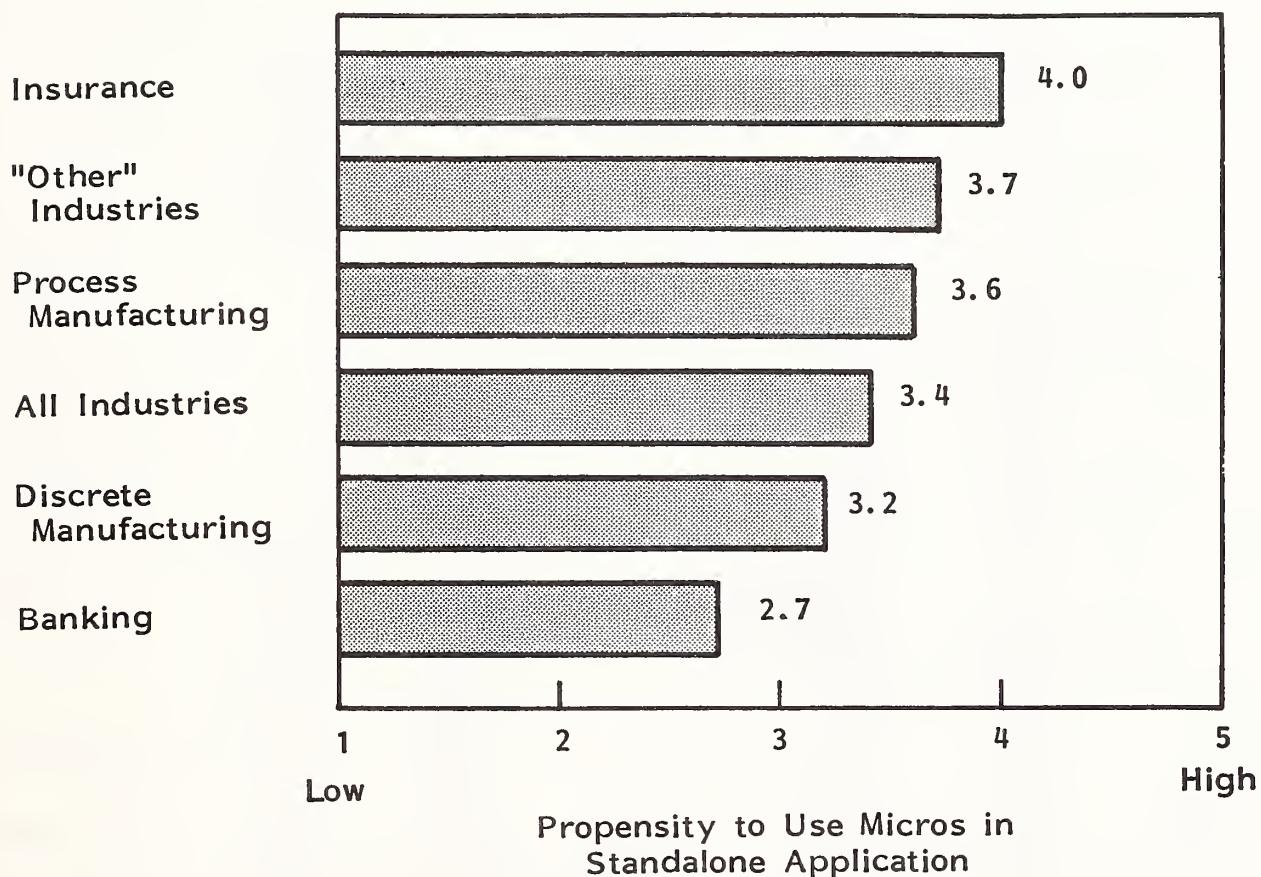


EXHIBIT III-10

PROPENSITY TO USE MICRO LOCAL AREA NETWORKS, BY INDUSTRY

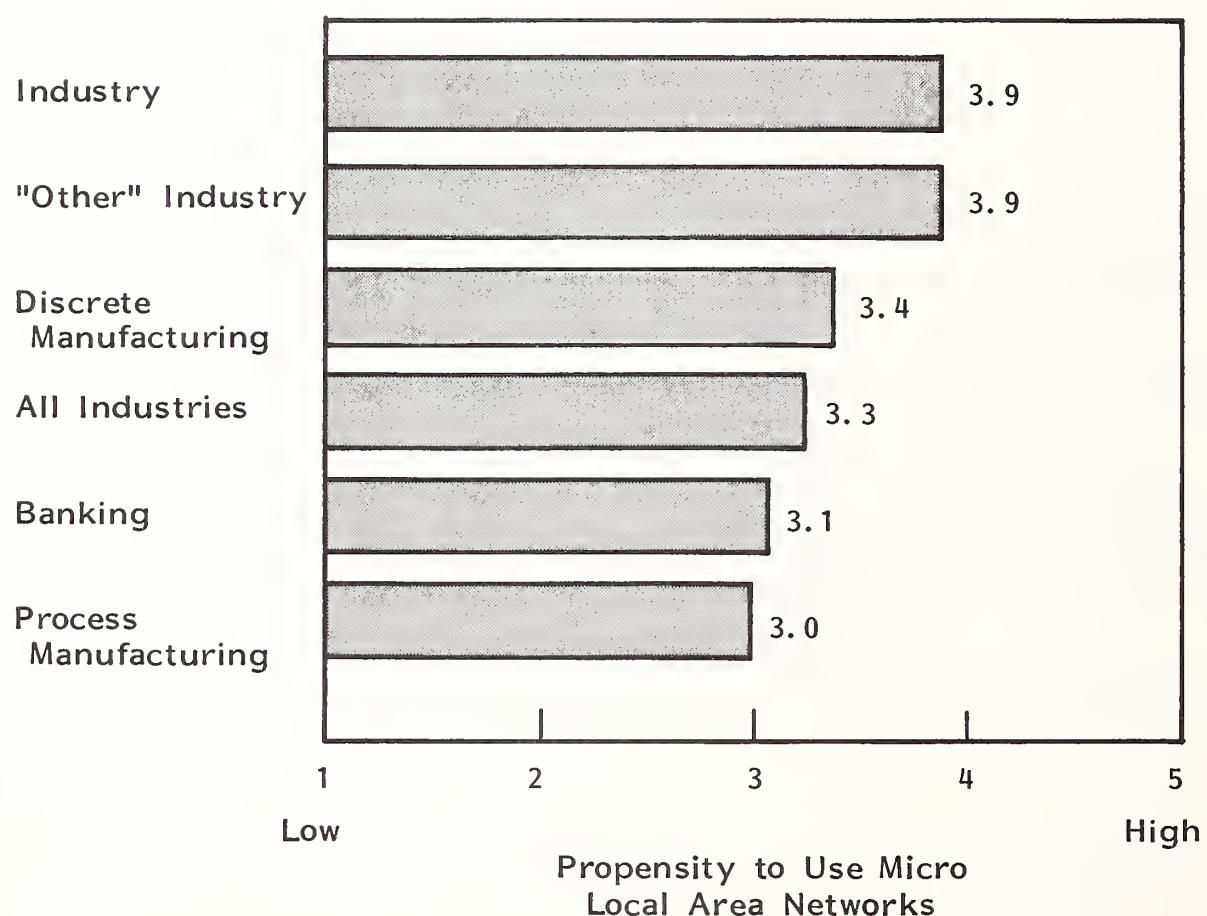
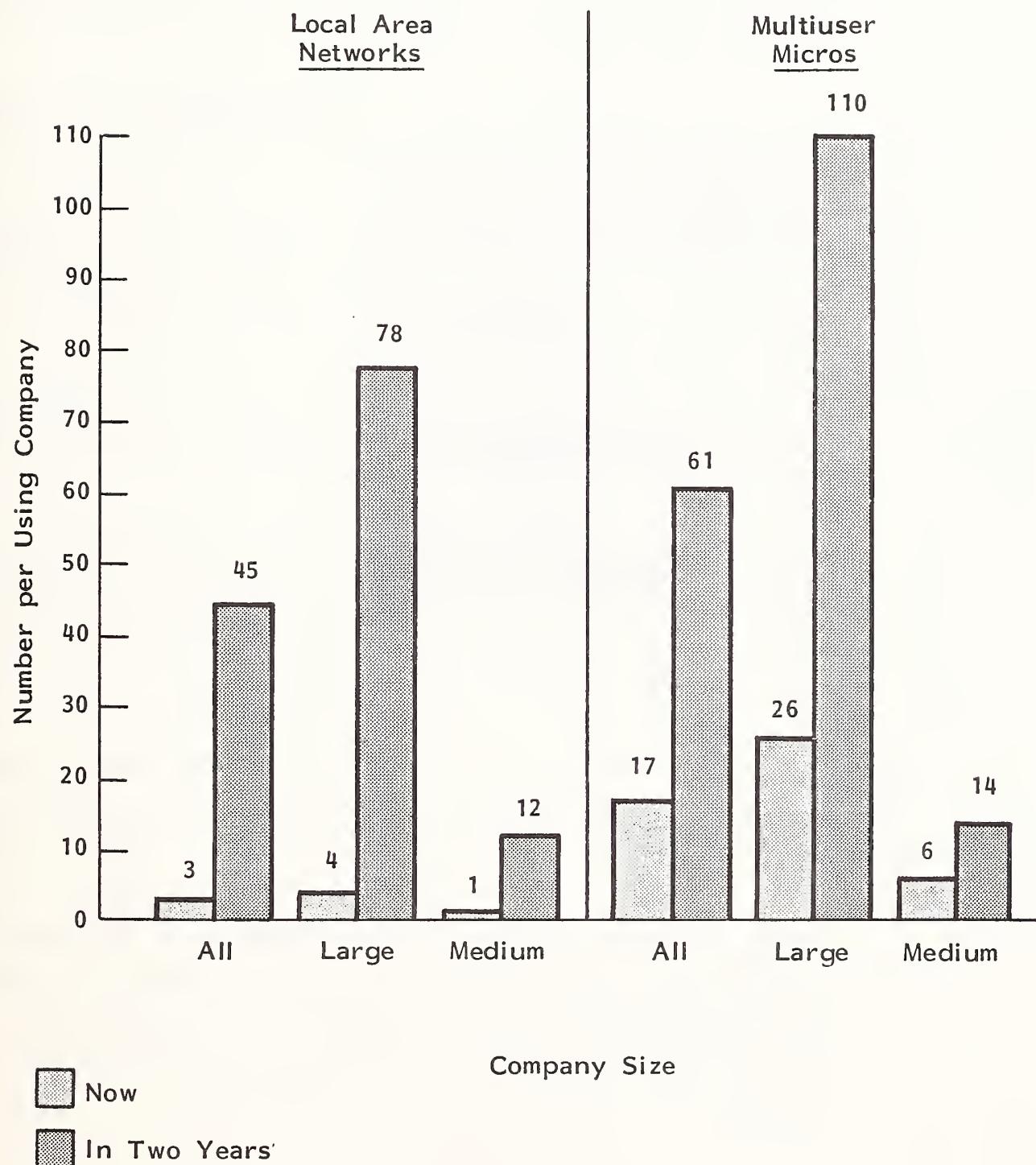


EXHIBIT III-11

NUMBER OF LOCAL AREA NETWORKS AND
MULTIUSER MICROS PER COMPANY



- These growth rates are impressive, but they start from a relatively low base.
 - More important, it became clear in the course of the study that a considerable number of corporations view LANs and multiuser micros as functionally equivalent. Hence, these numbers include some double counting between the two categories.
 - For further analysis on this point see the INPUT report Micro-Mainframes: Telecommunications.
- As shown in Exhibit III-12, corporations give moderate importance to inter-micro connections, but they place considerably more importance on M-M connections within their own enterprise.
 - Communicating to mainframes in other companies or to public data bases is given less importance by corporations.
 - Vendors, asked parallel questions, saw communicating to the corporation's own mainframe and to public data bases as being more important than did corporate respondents. Vendors must be careful not to get too far in front of customers in this and other respects.
- One of the findings of the corporate survey that may be surprising to vendors is the complexity of M-M linkages foreseen by corporations. Details are in Exhibit III-13.
 - Linkages are seen as being required to different manufacturers' mainframes, telecommunications environments, and DBMSs. In addition, M-M links are seen as accelerating the use of relational data bases (sensible from the standpoint of having transparent M-M data base control).

EXHIBIT III-12

CORPORATE AND VENDOR ASSESSMENTS OF THE
IMPORTANCE OF MICRO COMMUNICATIONS

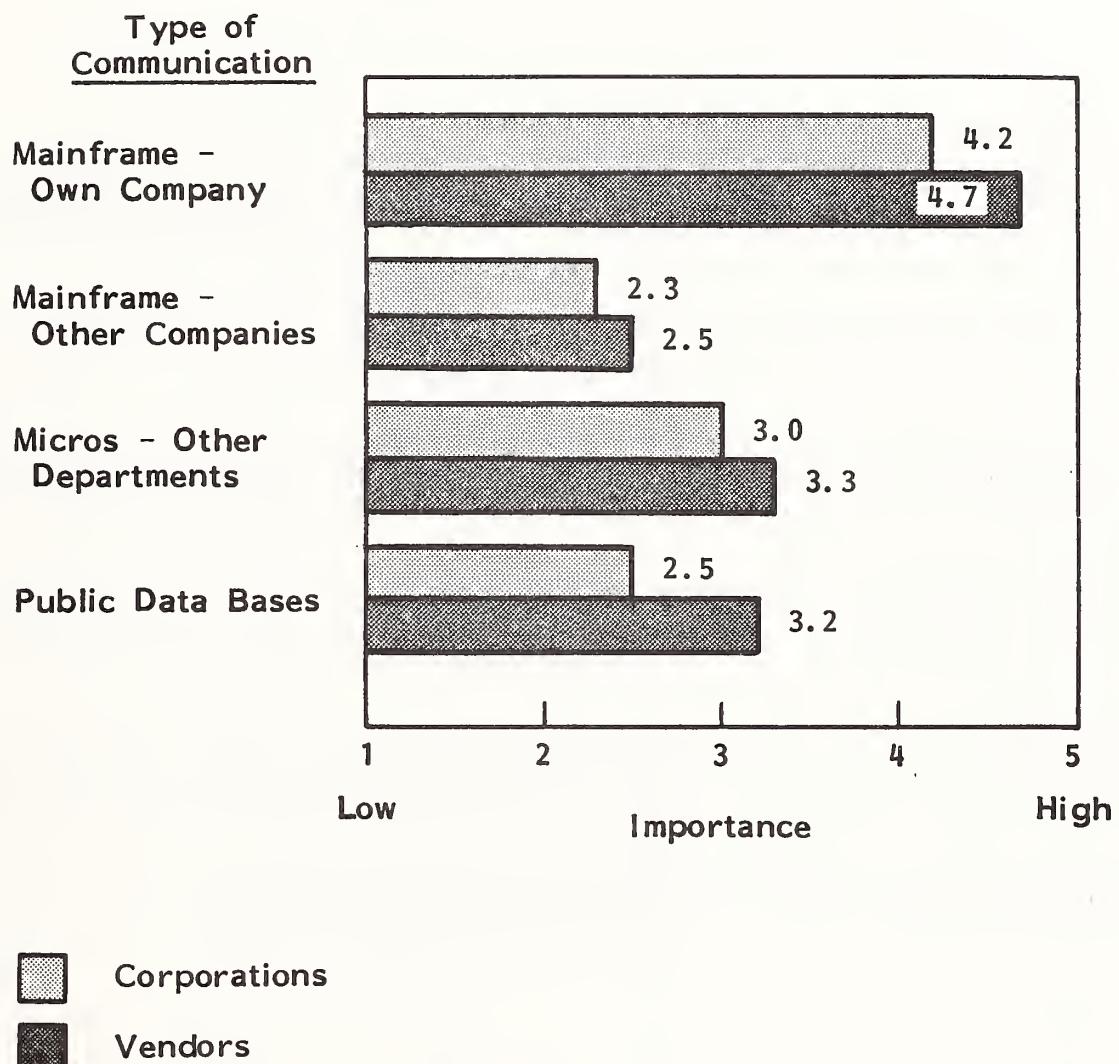
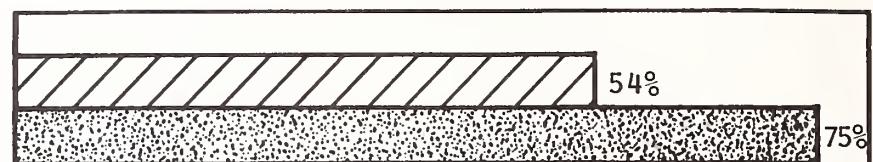


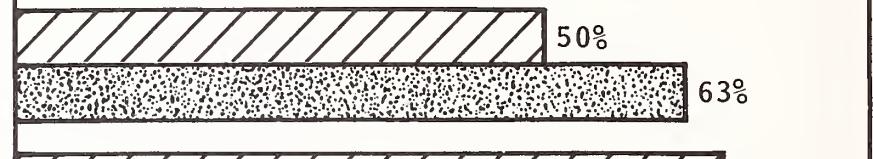
EXHIBIT III-13

COMPLEX ENVIRONMENTAL LINKAGE REQUIREMENTS:
CORPORATE AND VENDOR ASSESSMENTS

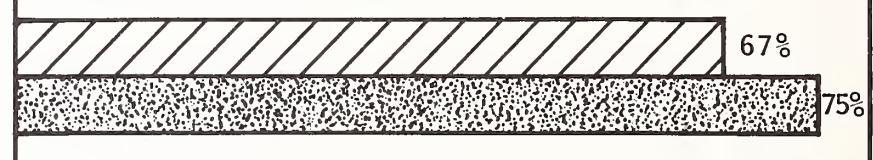
Multiple Mainframe Linkages



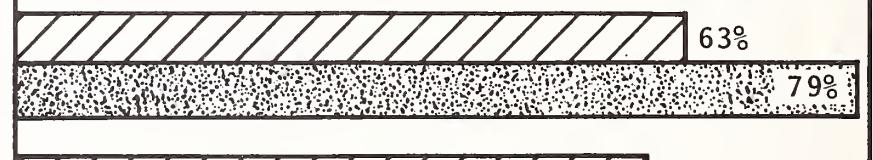
From Same Micro



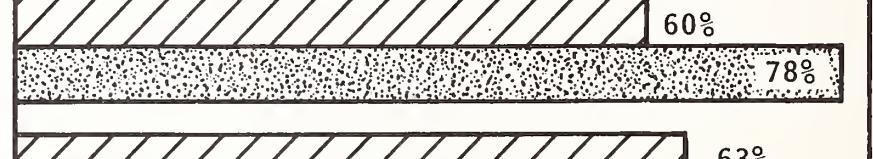
Multiple Telecommunications Environment



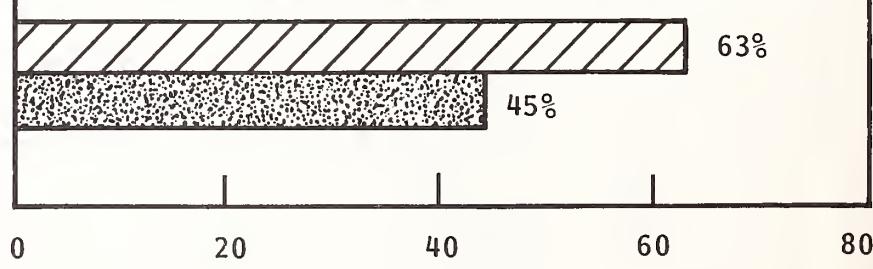
Multiple DBMS Linkages



From Same Micro



Accelerated Relational DBMS Use



Percent of Companies Requiring
Corporations Vendors

- Almost as high a need is foreseen for multiple linkages from the same micro. This is consistent with the view of multifunction local workstations tied into a variety of applications.

IV THE RCS OPPORTUNITY

IV THE RCS OPPORTUNITY

A. OVERVIEW

- The new conventional wisdom for RCS firms is that they should become "applications oriented" and attempt to add value.
 - Too often this has meant that, at best, the RCS firm will develop a custom application for a customer that will be run on the RCS firm's equipment.
 - Often this is initially agreeable to a client for reasons of time or expediency. However, the client usually believes (often correctly) that operating costs would be significantly reduced if the application were brought in-house. Such applications are in fact increasingly being brought in-house after the initial contractual period is over. Obviously, clients do not feel that sufficient value is being added.
- These problems have been exacerbated by micro-based systems. End users usually believe (often wrongly) that micro-based systems can give them the cost and control benefits of in-house systems, with the speed and flexibility of vendor-supplied systems.
 - Many RCS firms have gotten on the "micro band wagon" themselves, often as a defensive effort to make up for declines in their core business.

- RCS vendors' micro-oriented efforts have take a number of forms:
 - Becoming a sales agent for micro hardware.
 - Becoming sales agent for micro software.
 - Placing some application funtions in micro-based frontends to feed the core RCS application.
 - Placing mainframe applications on micros.
 - Writing new micro software.
- On the whole, these efforts have been surprisingly unsuccessful, compared to the more successful micro hardware and software companies and, increasingly, independent mainframe-oriented software vendors. These relative (sometimes absolute) failures have had diverse causes.
 - Me-too (or worse) products.
 - Lack of product or marketing integration.
 - An unclear picture of where the micro products fit into the vendor's strategy.
- Generally speaking, when problems have occurred they have been because vendors have focused more on meeting their own needs than they have those of customers.
- In several cases, it has been clear that micro-based products were provided with as little functionality as practical in order to preserve as

much vendor processing as possible. Even where the intent was not immediately clear to the customer, the resulting performance problems were.

- In other cases, the micro-oriented products were unintegrated add-ons to the product line: the sales force did not understand the new products and had few incentives to sell them.
- RCS vendors that are, or will be, successful in this market will have to fully accept that this is a new market; however, it is a new market in which an RCS firm may have unique advantages. Generally, this is a new market because:
 - The underlying technology has different user implications than those for mainframe computers (whether in-house or RCS equipment).
 - Uses and applications are still evolving.
 - Standards, in general, have not yet been agreed on.
 - Decision-making channels within customer organizations are in a state of flux.
- The obvious, but difficult-to-achieve objective for RCS firms is to provide the communications/applications "glue" that can hold large groups of micros together. However, this will not be an easy or simple proposition. These issues can best be illustrated by analyzing two major cases:
 - A mixed success story in cash management.
 - A just-opening opportunity in manufacturing.

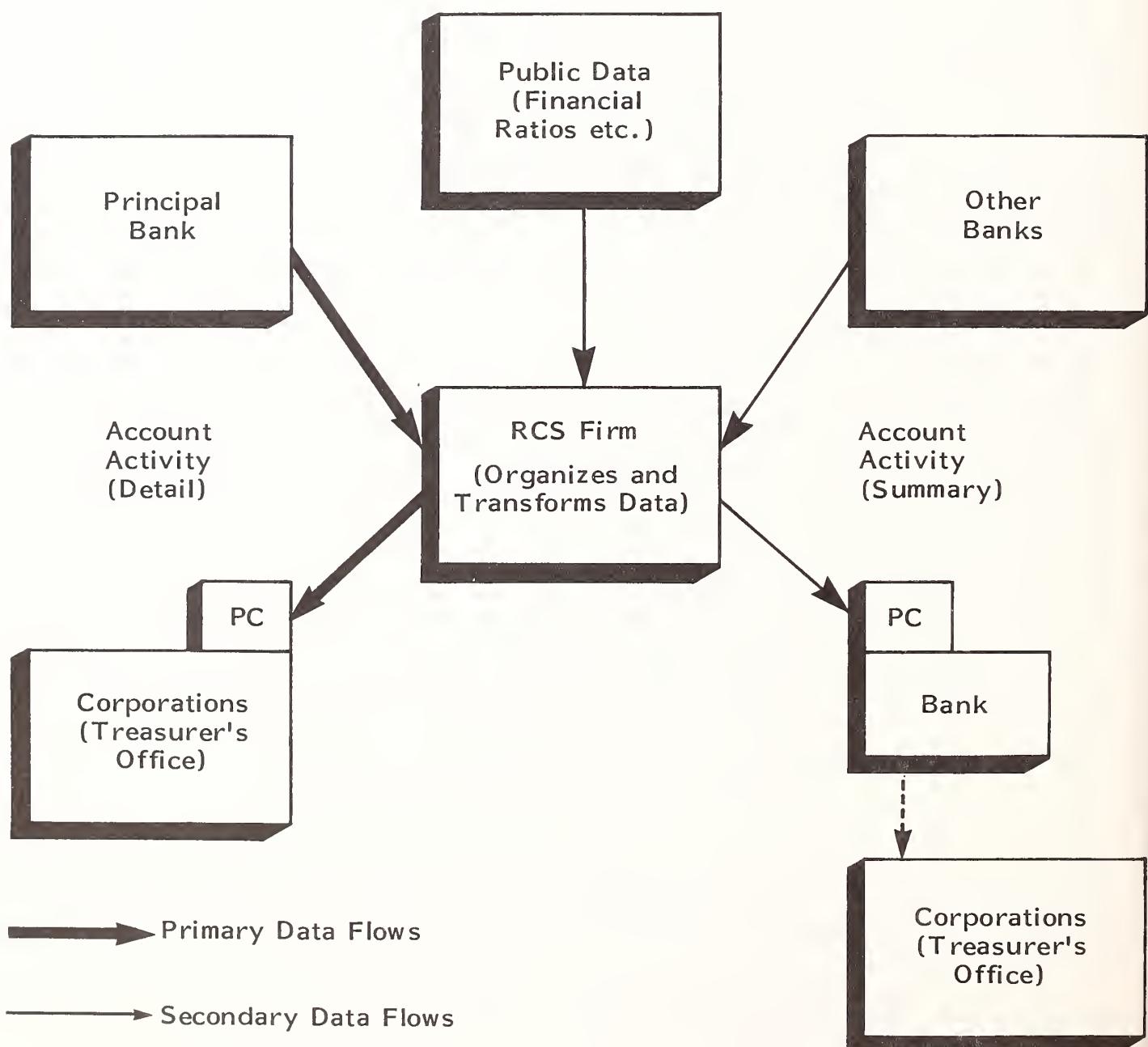
B. MIXED SUCCESS IN CASH MANAGEMENT

- For some time a major money center bank had been offering the treasurer's office of key customers access via terminal to the customer's account records at the bank. This enabled improved management of two key functions:
 - It will keep cash balances at optimum levels.
 - It will identify errors (either the bank's or the customer's) as soon as possible and will notify the bank to take corrective action.
- This arrangement has had benefits for both sides, not least of which for the bank is the closer tying of key customers. However, there have been problems.
 - The corporate treasurer's office must dial up the bank, pass security checks, and go through the bank's log-on procedure. None of this is particularly user friendly, having been designed for internal bank use at a time when these kinds of "frills" were seen as less important.
 - The load on the bank's communications network is increased in ways that the bank cannot easily project or control.
 - Because of this variable communications impact, the bank could not decide what the correct level of charges for this service should be (i.e., based on marginal, average, or peak costs).
 - Part of the reason for the bank's uncertainty over charges is that customers really wanted more than relatively inflexible terminal access to their account data. To be really valuable to customers this kind of data would have to be combined and manipulated in various ways so that the customer could perform additional analysis.

- In addition, certain parts of the bank have always been worried by "outsiders" (even if customers) having access to bank files. This worry has only been reinforced by media stories of computer file invasions by teenage "hackers." IS assurances of the adequacy of its computer security have been taken increasingly less seriously.
- At this point a leading RCS firm proposed, and the bank eventually accepted, a joint approach that would help both the bank and its customers.
 - The bank would send account transactions to the RCS firm rather than directly to customers. Moving data files would reduce terminal traffic and also reinforce bank security.
 - The RCS firm would further process the bank's data into forms more useful to customers.
 - To add even more value, the RCS firm would also collect summary data from the other banks that a customer did business with and combine as much data as possible for a treasurer's office.
 - In addition, the RCS firm would also offer financial ratio and other data from public data bases to further assist treasurers' offices in performing their cash management functions.
 - This service is illustrated in Exhibit IV-1.
 - As a further inducement to treasurers' offices, the RCS firm offered a specially programmed IBM micro that included such functions as:
 - A simplified dial-up sequence.

EXHIBIT IV-1

CURRENT CASH MANAGEMENT MICRO-MAINFRAME LINKAGE -
RCS FIRM AS KEY INTERMEDIARY



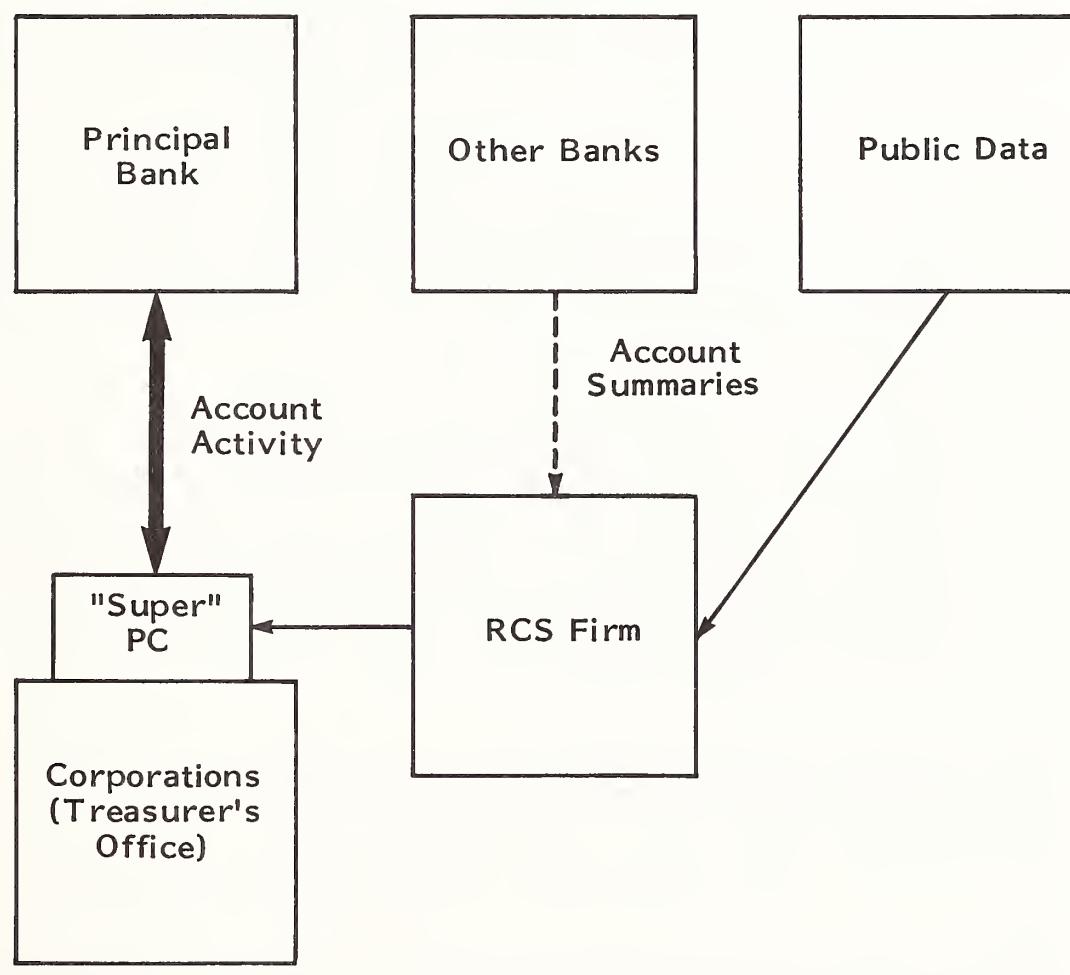
- The ability to automatically dial up and download account data at a prespecified time.
 - Menus for requesting data to be downloaded in one of several selections and arrangements.
- The initial reception to this service was quite positive. However, not long after implementation of this service, the IBM-XT was announced and this triggered considerable thinking in key customers' minds. Ultimately, a consensus arose, much to the discomfort of the RCS vendor.
 - The service from the RCS firm was good and certainly more useful than that previously received from the bank. However, the charges were considerably higher and customers were not sure if the cost/benefit ratio was any more attractive (remember, these customers' main function is money management).
 - More importantly, while the RCS firm was offering data reformatted in a number of ways, the choices were rather limited. Most customers were not that much better served than they had been by the bank's system, which they had learned to live with.
 - Finally, the XT's capacity made the more aware treasurers realize that finally:
 - They could keep all active detail on their own machine and be able to analyze it exactly as they wished.
 - They could have just as current a picture of their position as the bank had.
 - This meant that not only could they identify errors faster, but they could make corrections in their file first and then notify

the bank electronically (possibly even generating a correcting transaction to be approved by the bank and posted).

- Exhibit IV-2 shows the service customers would prefer.
- This has been a shock to the RCS firm, which was expecting significant business from this service, but instead this business has languished. Now the bank is not much happier, since:
 - The bank would have to make a significant (and unanticipated) investment to satisfy these key customers.
 - The security question is back again in an even more threatening form than before.
- For the bank, on the other hand, there are definite attractions to this service alternative.
 - Customers would be tied closer to the bank than ever before. (In the previous arrangement, the bank was somewhat concerned that another entity was interposing itself between the bank and the bank's key customers.)
 - With proper management, these customers will pay for the privilege of taking over the bank's most tedious and expensive work--error detection and correction.
 - In the long run, this kind of direct link could remove other operational steps, saving both the bank and its customers time and money.
- Where does this leave the RCS firm? It could volunteer to serve as the second-generation data conduit. However, the mathematics of the service cannot easily be made to come out right:

EXHIBIT IV-2

CASH MANAGEMENT CUSTOMERS' DESIRED MICRO-MAINFRAME LINKAGE
(RCS FIRM IN SECONDARY ROLE)



→ Primary Data Flows

→ Secondary Data Flows

- The RCS firm would have to do about as much work as before in the way of data handling and transmission.
 - However, the RCS firm's real and perceived added value would be much less than before, since the customer would be getting more or less raw data at its own request. While the RCS firm could add more data from other sources, potential revenue could be much less.
- Another possibility for the RCS firm is to serve as the network for the data transmission. However, there are problems here as well.
 - The actual amount of data to be transmitted is relatively small, since after the initial full file was transmitted, only changes would have to be sent thereafter.
 - The bank's concern over security will not be lessened with the addition of another link in the chain. To be creditable, the RCS firm would need to be able to offer a highly reliable, relatively low-cost, user friendly security method. It does not have this now, nor is it likely to have it in the near future.

C. EVOLVING OPPORTUNITIES IN MANUFACTURING

- The U.S. manufacturing industry had to put many automation and data processing plans on hold in 1981-1982 due to economic conditions. Now that the economy has revived, manufacturing promises to be one of the more aggressively automating sectors. (See Market Update: Discrete Manufacturing Opportunities for Information Services Vendors, June 1984.)

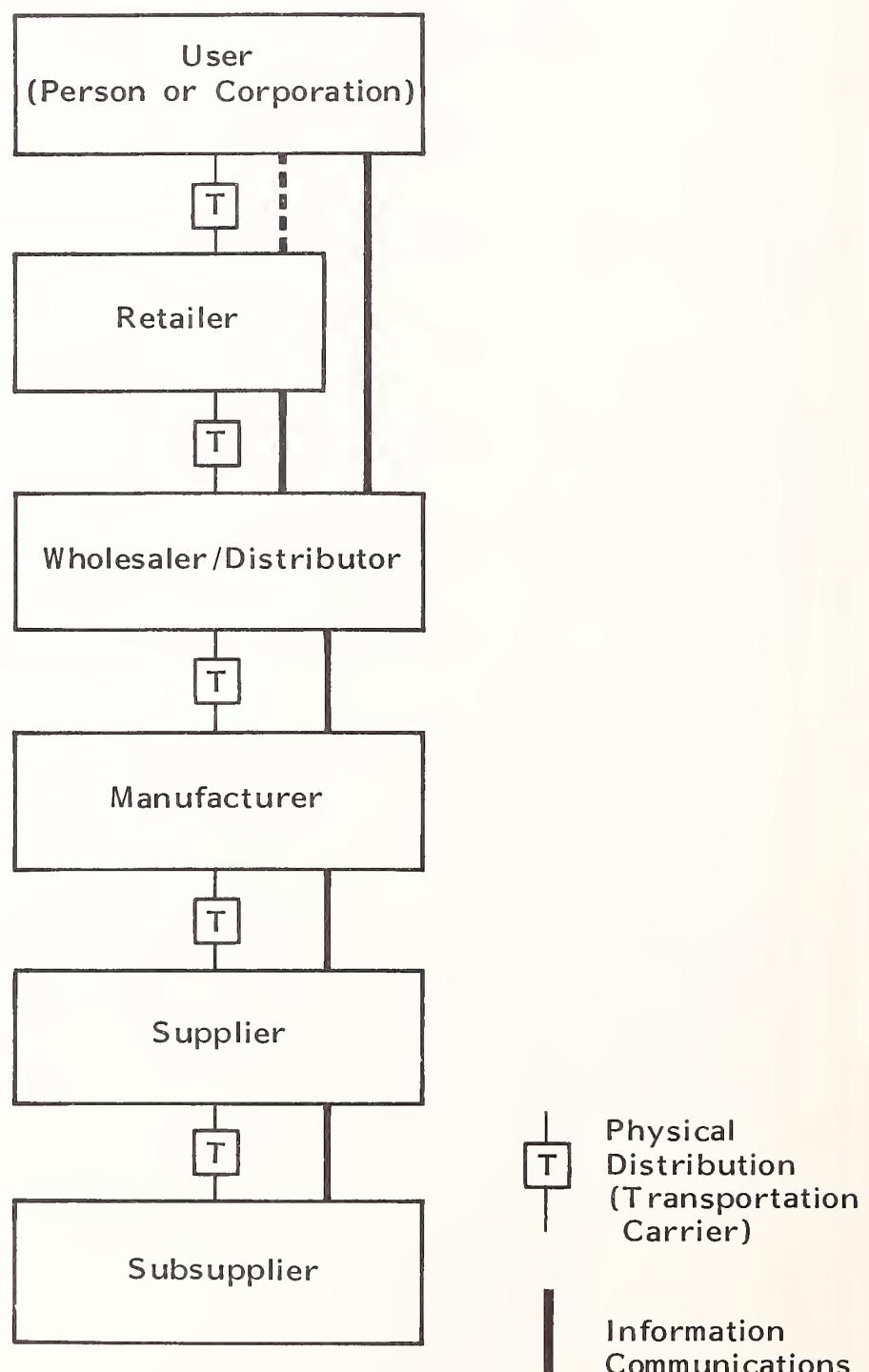
- One of the biggest challenges facing the industry is how to bring data to the right place at the right time.
 - Internally (within a single firm) this automating is often referred to as Computer-Integrated Manufacturing.
 - Externally, manufacturing companies must deal with a very complex chain of information and communications, as shown in Exhibit IV-3. Major information requirements include:
 - Contractual supply commitments.
 - Orders and component/parts releases.
 - Inventory status and reorders.
 - Changes and cancellations.
 - Invoice billings.
 - Inspections and acceptance/rejection.
 - Shipping and transportation documentation.

I. SUPPLIER COMMUNICATIONS OPPORTUNITIES

- Solving these external data linkages and requirements is beginning to be perceived by individual firm and trade groups as presenting at least, if not more, opportunities as solving internal system linkage problems.
 - Some manufacturing firms are discussing or piloting methods for key suppliers to link into their internal systems (e.g., inventories, order status, etc.) to cut down on current shipping delays, rekeying, late information, etc.

EXHIBIT IV-3

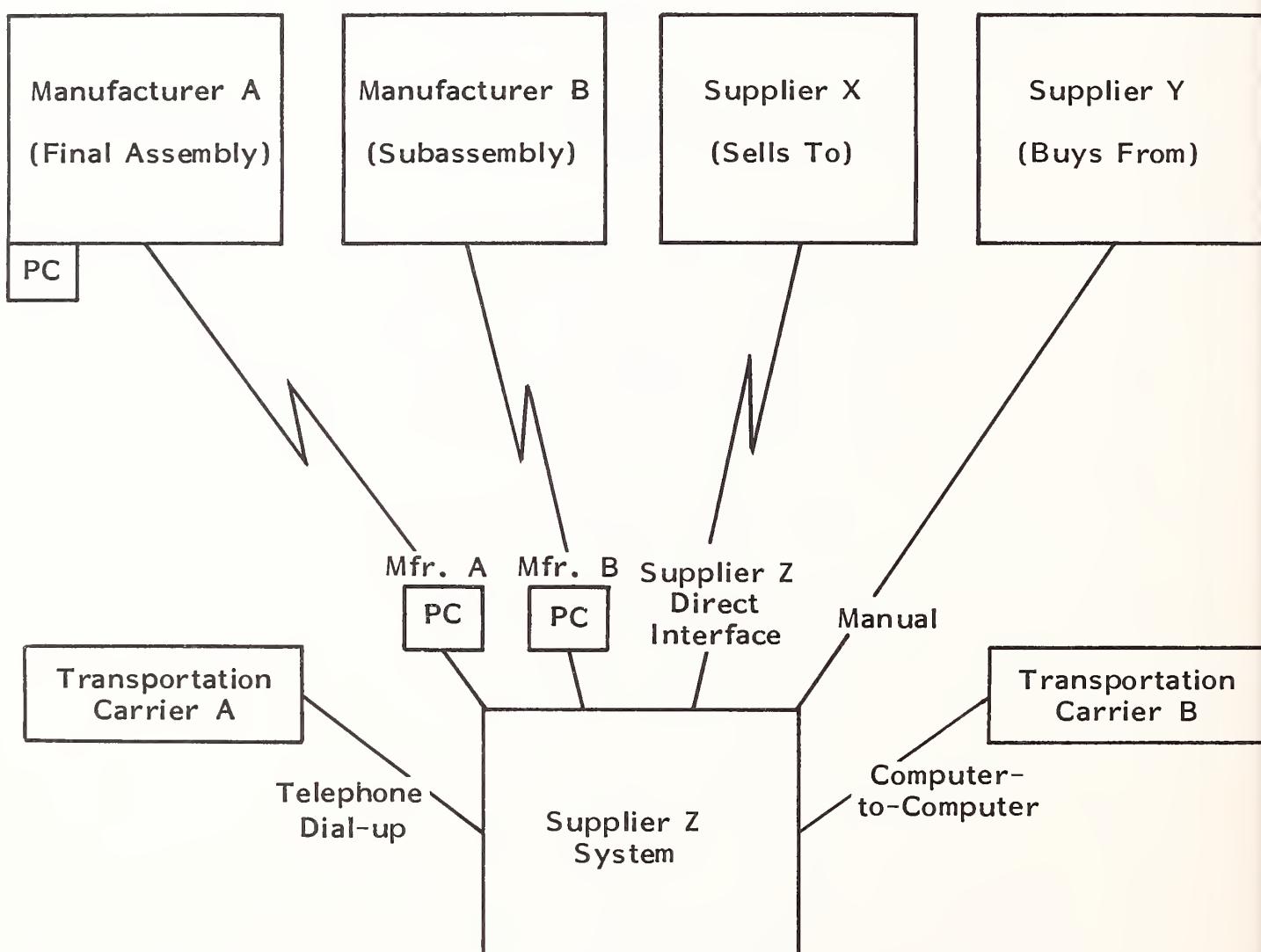
THE MANUFACTURING CHAIN



- Others are offering (or, in some sense, imposing) their own internally developed supplier system for suppliers. This is certainly superior to the current hodge-podge of direct computer communications, telexes, hard copies, and telephone messages.
- However, even the best supplier communications system for an individual manufacturer will optimize communications and parts supply from that manufacturer's standpoint. In many instances such as an individual system will only be pushing a manufacturer's problems down to its suppliers.
 - Exhibit IV-4 shows the kinds of relationships that an individual supplier (Supplier Z) must have with others it does business with.
 - The supplier will have to deal with different systems created by different manufacturers. In addition to there being differing technical interface issues, the types of data relationships may also differ, depending on business and operational relationships, e.g., whether the supplier:
 - Provides major components for final assembly.
 - Provides parts for subassembly.
 - Has each lot checked for acceptance or rejection.
 - Delivers for inventory or "just-in-time" use.
- Naturally, if a manufacturer is large enough or important enough to a supplier, the manufacturer can often impose its will on a supplier by making the use of the manufacturer's data systems a condition of doing business with the manufacturer.

EXHIBIT IV-4

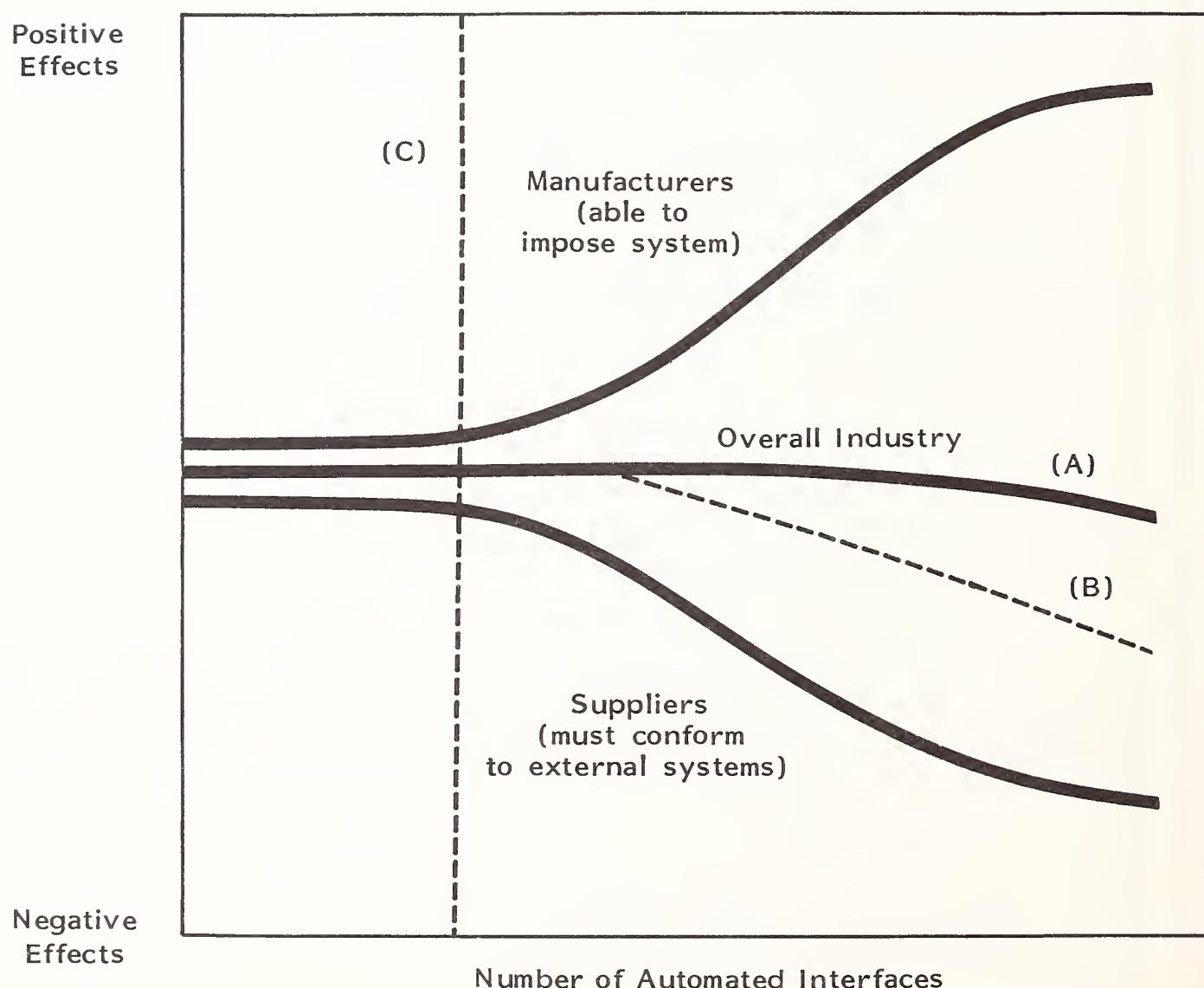
SUPPLIER COMMUNICATIONS: FROM A SUPPLIER'S VIEWPOINT



- About the same effect can be achieved by supplying entree to the manufacturer's network on highly concessionary terms.
- The large manufacturers that impose such connections (or are among the first to offer such connections in an industry) may find reasonably willing supplier partners and the resulting systems could prove almost as beneficial to suppliers as to the manufacturer.
- However, as time goes on and suppliers are forced to deal with more and more manufacturers (as well as other suppliers), the suppliers' benefits will rapidly decline until, at some point, the new "efficient" communications could become more costly and less useful than the systems it replaced.
- Taking an industry-wide view, there could be more losers than winners.
 - . If there is a relatively high concentration of business with a few major manufacturers then, on a weighted basis, the industry may not be badly affected, since there will be relatively few competing systems for suppliers to conform to, as shown in Exhibit IV-5.
 - . If there are numerous systems to conform to, then the entire industry will lose out. The industry will be better off if it had never begun and will in fact have probably begun to lose interest early.
- This paints a fairly gloomy picture since companies and industries are left with two fairly unappetizing alternatives.
 - Major companies have developed standalone interface systems, which lead to industrywide diseconomics.

EXHIBIT IV-5

EFFECTS OF AUTOMATED DATA COMMUNICATIONS ON MANUFACTURERS, SUPPLIERS, AND OVERALL INDUSTRY



Key:

- A = If there is a small number of different manufacturers' systems
- B = If there is a large number of different manufacturers' systems
- C = Industry decision point

- An industry takes an all-or-nothing approach, setting up a single centralized network to provide communications, protocol translation, and code/format translation. This is the path taken by property/casualty insurance companies with IVANS, as discussed in Chapter V. However, this approach is usually only feasible in regulated industries and/or those with a long history of interfirm cooperation.
- In fact the advent of micros has made the issues even more complex and, in the short run, more difficult, since micros will:
 - Add to the number of suppliers that can do meaningful computerization.
 - Extend down into a large manufacturer's organization the number of areas that can use computers.
 - Make smaller units more independent and self-confident in their use of computers.
 - Generally, raise expectations.

2. BUSINESS ENTRY ISSUES: STANDARDS

- It is this very complexity and difficulty that provides the opportunity for vendors in general and RCS vendors in particular. INPUT's current analysis shows two major alternate routes to entering this business area:
 - The industry standards approach.
 - The evolutionary approach.

a. Industry Standards

- The industry standards approach has been pioneered by the transportation industry under the leadership of an industry-sponsored group, the Transportation Data Coordination Committee (TDCC).
 - Under this approach, an industry sector reaches agreement on basic communication, message and coding protocols, and definitions. It is then the responsibility of individual companies, groups of companies, or commercial vendors to voluntarily implement the standards.
 - In the rail industry, for example, it was natural for the Association of American Railroads to take the lead and provide a service to its members for interchanging waybills between carriers. (This service has since been spun off as an independent entity, Railinc).
 - The rail industry, as a regulated industry, was used to working together; other industry users of the TDCC-based standard (like the grocery industry) have either set up their own individual systems or have used an RCS firm.
 - In the grocery industry, for example, about one-half the companies use a vendor. (The leading vendors are Tymshare, GEISCO, and SMC-Kleinschmidt.)
 - Informatics' Ordernet division is very active in the hardware distribution and allied sectors.
- However, the formal industry standards approach can take many years to bear fruit, as it has in the case of the TDCC standards (and the property/casualty insurance efforts).

- In addition, other general industry segments tend to be much more diffuse. For example, "manufacturing" is made up of a number of industry groupings that have little in common in their products or ways of doing business, e.g., the auto industry versus the electronics industry.

b. Evolutionary Standards

- Consequently, there are a number of evolutionary approaches that vendors can use. The key to success in the evolutionary approach is to place sufficient responsibilities on the ultimate user/customer as a test of customer commitment and as a form of cost sharing.
- The largest test of commitment (and largest up-front expense) is the mapping of user protocols and codes to a common set of interface standards. Exhibit IV-6 gives examples of some of the major requirements.
 - Environmental issues tend to be similar across industries and applications; environmental problems are what value-added networks are set up to solve.
 - Applications-related issues are unique to particular industries.
- In applications-dependent areas, enterprises will have to make their own code translation. The critical issue is whether a common coding pattern is (or will be) accepted in an industry. The alternatives for data and coding standards are, in order of preference:
 - An industry standard, tested and accepted.
 - An industry standard, accepted but not tested; this is less desirable since the standard:

EXHIBIT IV-6

INTERFACE REQUIREMENTS

ENVIRONMENTAL:

- Host Computer Type and Operating System
- Data Management System and File Structure
- Teleprocessing Monitor
- Communication Protocols
- Line Speeds

APPLICATIONS - RELATED (Manufacturing Examples)

- Unique Codes for:
 - Companies
 - Subsidiaries
 - Locations
 - Sublocations (Multiple Levels)
- Unique Codes for Parts and Materials
- Uniform Activity Definitions (e.g., Issue, Release, Ship, Receive, Requirements, Balance, Etc.)
- Data Item Specifications (e.g., Size, Location, Data, Dollars, Etc.)

- May not work.
- May turn out to not really be accepted, once implementation begins.
- An incomplete industry standard.
- A standard the industry is willing to develop and/or in the process of developing (e.g., the auto industry); however,
 - This is sure to take considerable time.
 - The resulting standard may not work or be accepted (e.g., these kinds of issues in the insurance industry have held back IVANS progress).
- The standards used by a leading firm.
 - These may be incomplete or may not work in some firms unless changed.
 - More importantly, other large firms might not use them (e.g., would Ford use GM's parts coding?).

c. Vendors and Standards

- The standard that a vendor chooses to use will, of course, depend on what is available, as shown in Exhibit IV-7.
 - The main variable is whether a firm is the initial vendor or a later entry.

EXHIBIT IV-7

VENDOR SELECTION OF INDUSTRY STANDARDS

STANDARD	SELECTION PREFERENCE FOR:	
	INITIAL VENDOR	SUBSEQUENT VENDOR
Industry Standard:		
In Use	1	1
In Development	2	3
Major Company's Standard	3	4
Customer's Standard	4	5
Vendor Standard	5	2

- There is a rare instance where being a later entrant can sometimes be almost as advantageous as being the first entrant.
 - If the initial vendor has successfully established or proven an industry standard, then that will obviously be the standard to adopt.
 - If the initial vendor has full or partial ownership rights, it would be desirable for the initial vendor to make a licensing agreement with a second vendor. Otherwise, the marketplace confusion that has occurred in VCRs, video disks, floppy disks, UNIX, etc. will hurt all vendors.
 - In fact, the presence of multiple service vendors using similar standards could provide a more robust market, since alternative sources will often make customers more willing to trust their business to only given vendors.
- Some vendors believe that they will profit by being sole supplier and by foreclosing competition; the precedent of IBM and IVANS is very strong here. This sole supplier ideal consists of the following components:
 - Providing a VAN service (i.e., translating communications-related protocols).
 - Providing EMS or mailbox services.
 - Providing bulk data transmission.
 - Providing the code and format translating (at the vendor's site).
 - Receiving some type of industry contract or approval.

- The last two points are those that most people would believe are critical to foreclosing competition. These are actually two-edged swords.
- In INPUT's experience, being a sole supplier (as IBM Information Network is for IVANS), while often unavoidable can be, at the least, uncomfortable and sometimes fatal for an incumbent.
 - Unrealistic expectations are engendered, either in the cause of being awarded the contract or as customers add to their wish lists.
 - There is also a very strong "grass-is-greener" syndrome, as customers think of all the vendors they are not allowed to use.
 - Competition by more-or-less equal vendors is the best way of educating customers as to what is feasible versus what is desirable.

3. BUSINESS ENTRY ISSUES: CODE TRANSLATION

- Actually performing the code translating may also appear very desirable because of the additional value-added processing involved.
 - However, the main added value is in the coding of industry-to-enterprise cross-reference tables, as shown in Exhibit IV-8, and in the underlying translation software.
 - As noted earlier, only the individual customer can adequately set up and maintain these crosswalks. The added value is really primarily the property of individual customers, although the industry wide experience gained by the vendor over time can be very important.
 - The underlying translation software is valuable, but the location where the translation is performed does not necessarily add or subtract from the software's value.

EXHIBIT IV-8

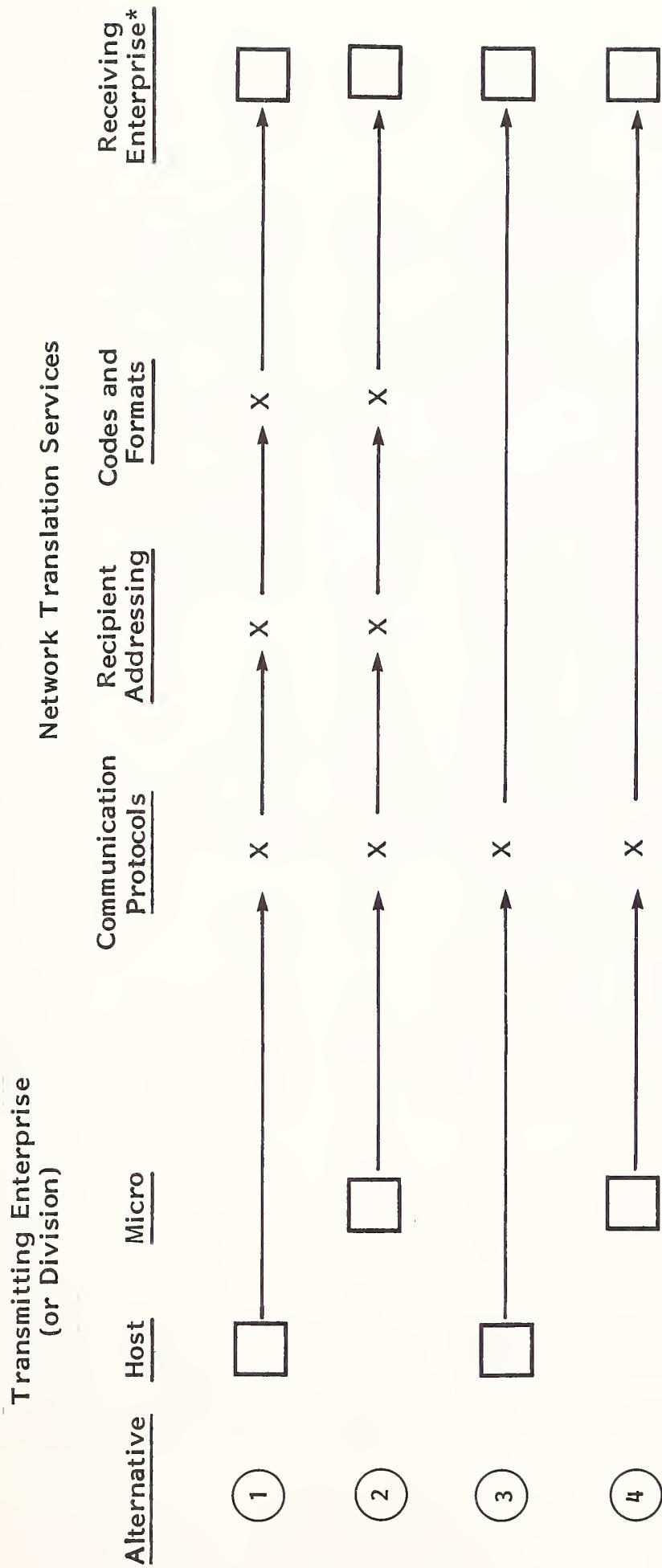
INDUSTRY PRODUCT CODE DIRECTORY SCHEMATIC

INDUSTRY CODE	ENTERPRISE CODE CROSSWALK FOR ENTERPRISE						
	I	II	III	IV	V	VI	ETC.
000001				A			
000002	A	B	QR		N		
000003				NRJ			
000004	Z			A			
000005							
000006							
000007	AJK						
000008	R				AL		
000009		L					
000010	NP						
000011						S	
000012			N				
000013						UDK	
000014		NNQ					
000015					MQA		
000016						GR	
000017						RG	
000018		ZX	QBL				TM
000019				M			
000020							

- Having the network provide applications-related translation (i.e., addresses, codes, and formats) is just one of three locii for the function, as shown in Exhibit IV-9. The other two are:
 - At the customer's central host.
 - A micro at or near the point of transmittal or receipt. This "micro-opportunity" represents one of the most significant opportunities open to an RCS firm.
- It is not at all clear that a network-based vendor translation service for applications-related data can provide the same level of service as can be provided where these functions take place on the customer's site. Criteria that can be used to judge potential service levels include:
 - Cost and complexity of providing the service.
 - Perceived data security.
 - Reliability of the overall service.
 - Flexibility from the user's standpoint.
 - The breadth and depth of code and format knowledge.
- Cost and complexity: The main issue here is the maintenance and access to one very large directory, as shown in Exhibit IV-8, versus distributed directories, as shown in Exhibit IV-10. On this basis a slight edge must be given to directories located on customers' sites.
- Perceived data security: On-site solutions are commonly believed to be more secure than those that have (often valuable) data residing at a distant location

EXHIBIT IV-9

INDUSTRY NETWORK TRANSLATION ALTERNATIVES



* Host/Micro Alternatives Not Shown, Since Issues are the Same as for the Transmitting Side

EXHIBIT IV-10

ENTERPRISE AND OPERATING UNIT DIRECTORIES

ENTERPRISE-LEVEL DIRECTORY

RECEIVING DIRECTORY CODES		TRANSMITTING DIRECTORY CODES	
INDUSTRY	ENTERPRISE	ENTERPRISE	INDUSTRY
2	A	A	2
4	Z	B	1,077
7	AJK	C	23
8	R	D	99
10	NP	E	1,234
23	C	F	98
25	BNR	G	797

OPERATING UNIT DIRECTORY

RECEIVING DIRECTORY CODES		TRANSMITTING DIRECTORY CODES	
INDUSTRY	ENTERPRISE	ENTERPRISE	INDUSTRY
2	A	A	2
4	Z	B	1,077
44	N	D	99
99	D	L	123
123	L	N	44
1,066	BB	Z	4
1,077	B	BB	1,066

under the control of another organization. This usually cannot change perceptions, even if a vendor's controls and procedures are in fact superior.

- Reliability: Most RCS services are quite reliable and trouble-free. Micros, however, are quite reliable themselves and the lowered complexity of micro systems makes them, in principle, quite robust. For organizations with uniform micro inventories, backup becomes fairly simple.
- User Flexibility: Micros are perceived, to a large extent correctly, as being very flexible toward meeting changing user needs. Host-based systems, by their nature, are more difficult to change. RCS vendors have always had a conflict between wishing to meet a customer's particular needs and having to keep the core of any product uniform in order to control costs and minimize support problems.
- Code Knowledge: There are two aspects to this: the breadth of knowledge, where a vendor will perform very well due to having worked with many clients; and the depth of knowledge of a particular client's needs, where the client will generally understand its own idiosyncrasies better than anyone else. The deeper into a client's organization one goes, the greater the contrast in these two attributes.
- Exhibit IV-11 summarizes the extent to which these needs can be met by a vendor's network, as opposed to an on-site solution.
 - There is a constant, although not great, tendency for the micro solution to be more desirable. (The needs were not weighted, since the importance will vary depending on the customer and application.)
 - This gap is likely to widen as micro hardware and software becomes even more cost-effective and as vendors and users learn how to use them.

EXHIBIT IV-11

EFFECTS OF TRANSLATION LOCATION ON SERVICE SATISFACTION

SERVICE NEEDS	VENDOR NETWORK	SERVICE LOCATION	
		CENTRALIZED (Host)	CUSTOMER SITE
Cost and Complexity	B-	B	B
Perceived Data Security	B-	B+	B+
Reliability	B	B	B+
User Flexibility	B-	B	A
Code Knowledge			C
- Breadth	A	B	
- Depth	C	B	A

Keys: Letters are "grades", with A = High

- Consequently, RCS vendors should use their resources and skills to learn how to let this new current carry them forward, rather than attempting to swim against it.
- Does this mean that vendors will be giving up revenue opportunities by having applications-related translation take place on a customer micro? Not necessarily, as Exhibit IV-12 summarizes:
 - Data transmission and communications protocol translation will exist in all alternatives.
 - Even in the micro alternative, vendors can provide a backup translation service.
 - The micro alternative provides a means for otherwise unavailable hardware and software sales.
- While much of this scenario was focused on the manufacturing sector for greater specificity, these principles hold across all industry and application types.

D. ANALYSIS OF RCS OPPORTUNITIES

- Many RCS firms will prefer to view micros as "super terminals" and then believe that this is M-M connectivity. For the following reasons there will be a strong tendency for this to occur:
 - Vendor personnel will be more familiar with this approach and, by analogy, it will seem closer to the traditional RCS business.
 - There will be fewer technical changes required.

EXHIBIT IV-12

EFFECTS OF TRANSLATION LOCATION ON VENDOR BUSINESS OPPORTUNITIES

BUSINESS OPPORTUNITY	SERVICE LOCATION		
	VENDOR NETWORK	CENTRALIZED (Host)	CUSTOMER SITE
Data Transmission	Yes	Yes	Yes (Potentially, greater than centralized)
Communications Protocol Translation	Yes	Yes	Yes
Applications-Related Translation Service	Yes	Yes (Backup)	Yes (Backup)
Hardware Sales	Doubtful	Doubtful	Potential for Turnkey Sales
Software Sales	No	Up to Several Locations per Entity	Many Locations per Entity
Software Maintenance	No	Yes	Yes

Note: "Yes", "No", etc., refer to the extent of the opportunity for vendor business development

- There will appear to be more opportunity to sell RCS host resources (hardware and software).
- However, these tendencies should be resisted, since from the customer's standpoint the resulting solution will often be more expensive and less satisfactory than alternatives.
- A seemingly attractive method of serving as a connectivity alternative is to be, in effect, the agent of a large corporation. However, as described in section B of this chapter, this position can be dangerous.
- When the RCS vendor is in a "one to many" position, as shown in Exhibit IV-13, even an extensive amount of business is riding on the decisions being made by a handful of people within a single enterprise. Another contemporary example is that of the post-EDS GM and its future relations with the RCS vendors (ADP, Reynolds and Reynolds) that provide communications with GM dealers.
- A single customer will always be evaluating the vendor's performance and looking to take over the vendor's function based on the trade-offs between:
 - Control.
 - Efficiency and performance.
 - Cost.
 - Image.
- A much better connectivity position to be in is a "many to many" relationship, as shown in Exhibit IV-14. In this instance, pulling a function in-house is a much less viable option; switching to another vendor may be difficult, but this is a more normal commercial risk. More importantly, the loss of any particular client would rarely be a crippling blow.

EXHIBIT IV-13

DANGEROUS CONNECTIVITY - ONE TO MANY

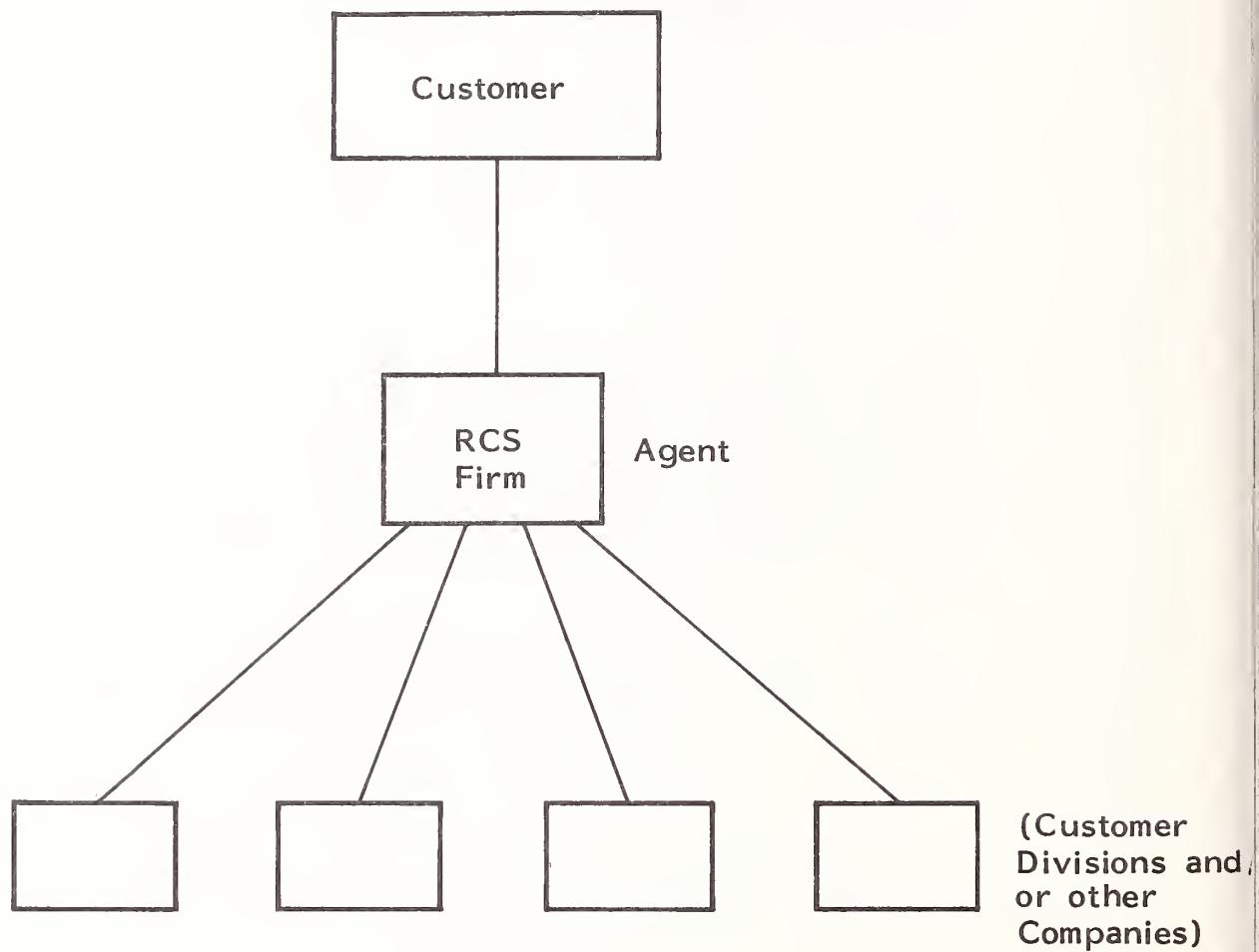
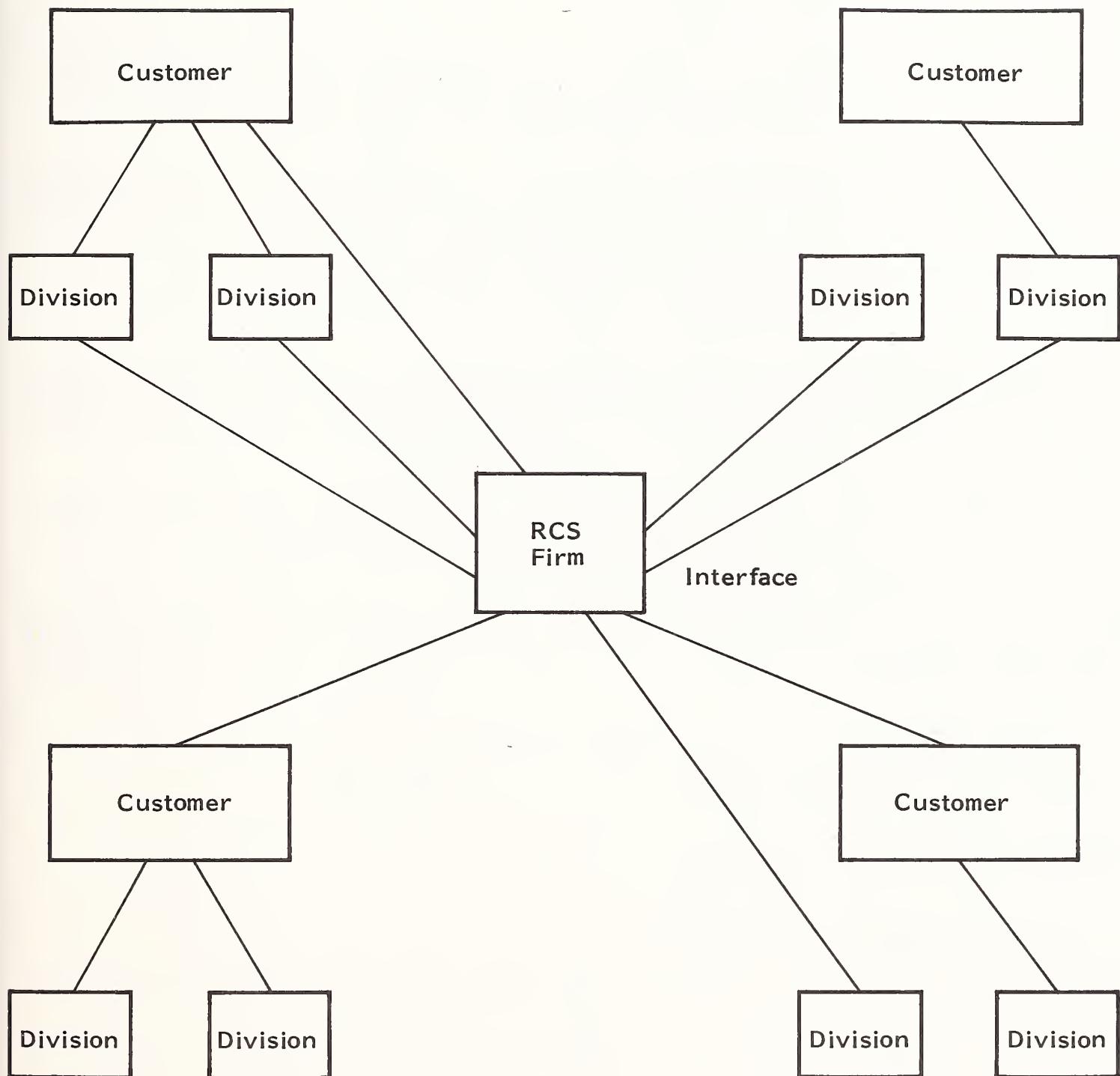


EXHIBIT IV-14

ATTRACTIVE CONNECTIVITY - MANY TO MANY



- Another important planning decision for RCS firms is how specialized or generalized a service they wish to offer. The options range from the all-things-to-all-people of AT&T's Net 1000 to proprietary applications for a single client:
 - Although it is difficult to make a single judgment in this area, INPUT believes that the middle way is usually best, as shown in Exhibit IV-15.
 - Only an AT&T or an IBM has the resources to offer a credible generalized product. Interestingly, IBM is feeling its way in this direction slowly and carefully. AT&T's performance so far shows the dangers involved.
 - In-house contracts, if large enough, can be good business and can provide experience. However, the leverage is relatively small.
 - The "tailored" approach has, in many ways, the best of both worlds. However, initial targets need to be carefully selected.

EXHIBIT IV-15

CONNECTIVITY ALTERNATIVES - ADVANTAGES AND DISADVANTAGES

TYPE OF CONNECTIVITY SERVICE	ADVANTAGES	DISADVANTAGES
Generalized (e.g., AT&T's Net 1000)	<ul style="list-style-type: none"> ● Lower Cost ● Leverage Skilled Personnel ● Able to Choose from Wider Range of Opportunities 	<ul style="list-style-type: none"> ● Flexibility versus Complexity Trade-off ● Difficult to Maintain Industry and Function-Specialized Knowledge
Tailored (e.g., IVANS, OrderNet)	<ul style="list-style-type: none"> ● Tailor Technical Resources to Particular Targets ● Moderate to Low Cost ● Can Become Very Expert in Particular Areas 	<ul style="list-style-type: none"> ● Less Flexibility in Changing Business Targets
Unique (e.g., In-House Solution)	<ul style="list-style-type: none"> ● Can Meet Specialized Needs ● Control Priorities and Resources ● Can Give Proprietary Edge to Business 	<ul style="list-style-type: none"> ● High Cost ● Significant Software Overhead ● Scarce Skills Required ● May Be Difficult to Respond to New Requirements ● Interfaces to External Systems ● Could Become Obsolete As a Result of Industry Standards

V THE TURNKEY OPPORTUNITY

V THE TURNKEY OPPORTUNITY

A. THE PROBLEM

- Most, if not all, turnkey vendors do not view micros as an opportunity, but as the problem lampooned in Exhibit V-1.
 - So far micros have nibbled, rather than gobbled, traditional mini-based turnkey markets. However, the handwriting is definitely on the wall.
 - Established turnkey houses have been essentially transfixed by the problem of converting--or not converting--part of their product line to micros.
 - The problem will become even more acute as multitasking, multistation IBM micro successors are released. Minicomputer capability and micro systems become a reality at that point.
- The software conversion issue is perhaps a less important problem.
 - Most turnkey software has become quite mature by this time anyway, and a fresh start would be useful from the standpoint of both functionality and user friendliness.

THE TURNKEY NIGHTMARE

SYSTEMS HOUSE SLAIN BY MICROCOMPUTER

Beast devours entire customer base

BOSTON, MA—Bet Your Business Inc., a major systems house, was destroyed today when all its customers and prospects suddenly switched to business oriented microcomputers.

"We had no software," explained Bet Your Business President Sterling Hindsight from his hospital bed. "All our business programs were written for minicomputers. Who would have guessed that big micros would attack so suddenly?"

"We had to change to microcomputers," said a former Bet Your Business customer. "With Trac Line business software and an ordinary micro, we had better control of our operations than we ever got with a minicomputer. And for about one-tenth the cost!"

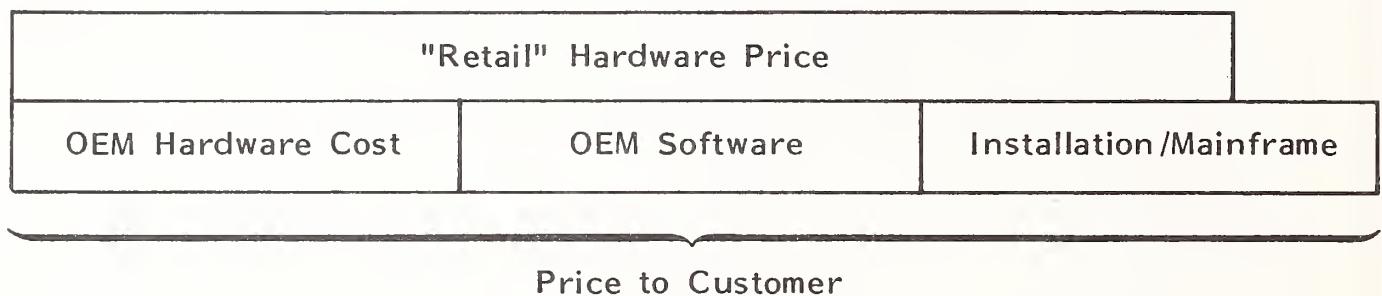


(By permission, Trac Line Software, Hicksville, New York)

- Presenting the conversion as (being at least) partly beyond the control of the vendor could be used to good effect to obsolete the current product line without creating ill-will on the part of current customers.
- The real problem is one of pricing, or more specifically, of pricing expectations and benchmarks.
 - ✓ - Mini-based turnkeys have typically been priced modestly above the hardware manufacturers' quantity-one, fully configured hardware price. Details are in Exhibit V-2.
 - This was due to the deep discount on OEM equipment and the fact that, at least until recently, mini manufacturers much preferred "moving iron" to OEMS rather than learning how to sell to end users.
 - This, too, is changing, but at a relatively slow rate and in ways that will give OEMS considerable protection.
- The micro hardware situation is worse in two respects:
 - Micro prices are, of course, below mini prices, both on a price/performance basis and even more so on a "box versus box" basis.
 - Worse, there is much less of a discount for OEMS.
 - There is an absolute floor on prices due to materials, distribution, etc.
 - End-user prices themselves are really "retail" prices, with little manufacturer control possible and much commodity and/or loss-leader discounting.

EXHIBIT V-2

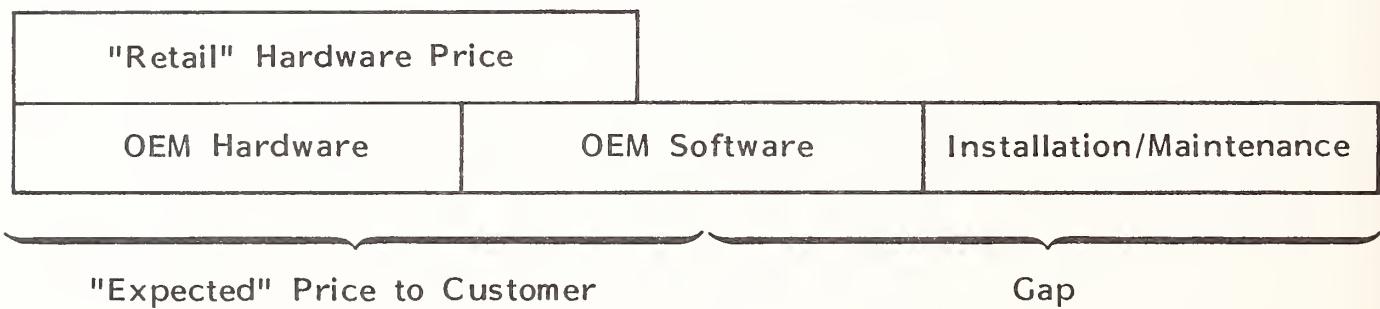
TURNKEY PRICING RELATIONSHIPS:
MINICOMPUTER BASE



- Manufacturers (i.e., IBM) have active discount programs to large corporate customers. A large-quantity corporate discount can equal or surpass a small-quantity OEM discount.
- Even worse is the fact that software and installation costs for micro-based systems are not intrinsically lower than for mini-based systems.
 - This causes the "pricing gap" shown in Exhibit V-3.
 - The pricing gap is underlined by the numerous software vendors that sell vertical-market micro software in the high hundreds or low thousands of dollars.
 - Many of these products come nowhere near to doing their intended job due to quality and design failings.
 - A few, though, do perform reasonably because they have been priced and marketed for relatively high-volume, low-support markets.
- If micro software is pushing at traditional turnkeys from the bottom, where is the micro-based opportunity? There are, in INPUT's view, two emerging high-end micro-driven opportunities:
 - Turnkeys with flexible functionality.
 - Distributed turnkeys.
- The next two sections analyze these two opportunities.

EXHIBIT V-3

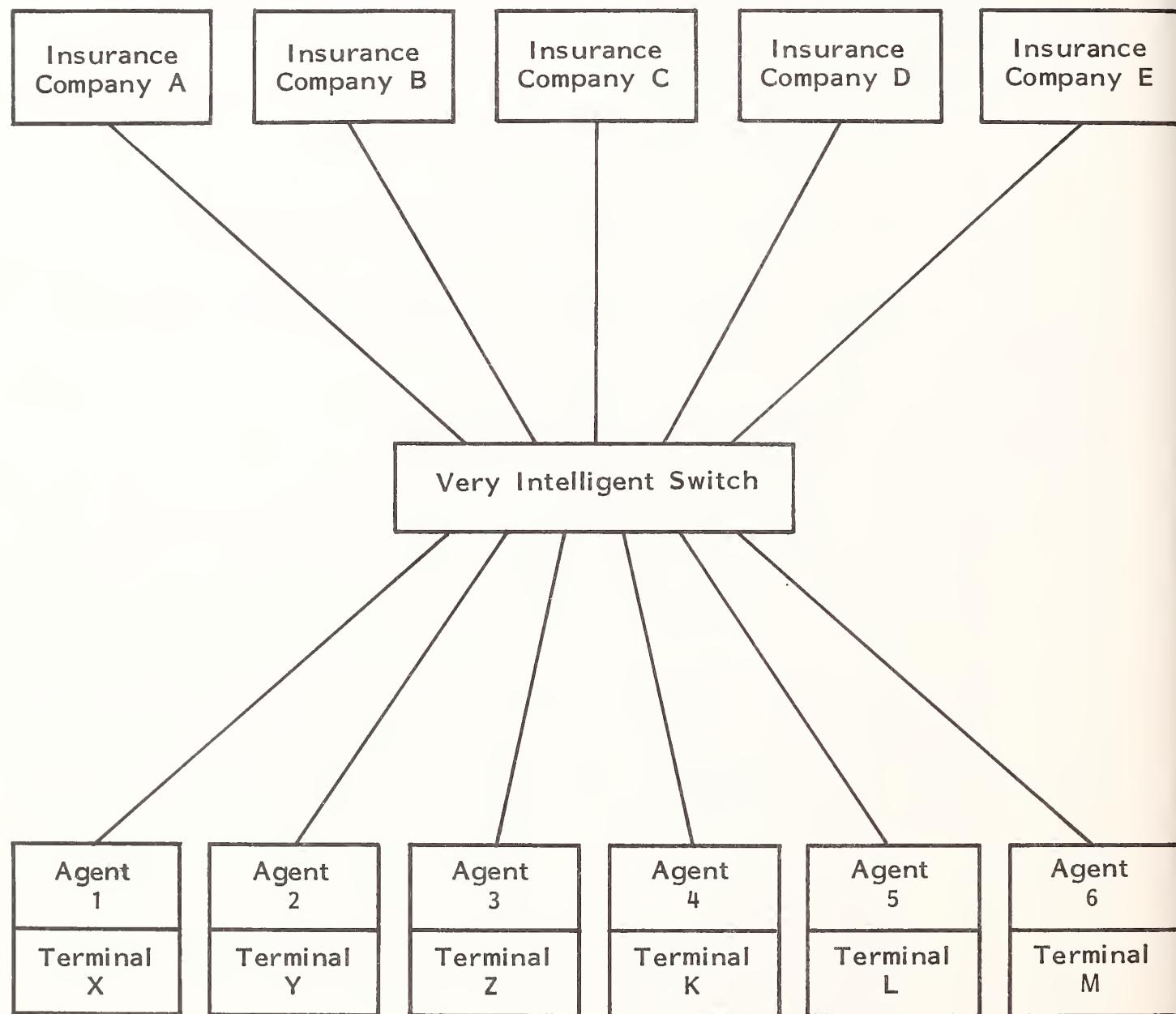
TURNKEY PRICING RELATIONSHIPS: MICROCOMPUTER BASE



B. FLEXIBLE FUNCTIONALITY: CASE STUDY

- To illustrate this type of turnkey, this section will use a product analysis from what would at first appear the most unlikely of industries, the property/casualty (P&C) insurance industry. P&C would appear a poor target because it:
 - Has been losing money on insurance operations.
 - Is currently in the midst of a gigantic M-M project (IVANS).
 - Is dominated by Policy Management Systems (PMS) for internal administrative software.
 - Has traditionally been very host oriented.
- However, with some background, it can be better understood why this industry's experience is in fact representative of M-M futures in general and micro-based turnkey opportunities in particular.
- The most visible M-M initiative now going on in the insurance industry is the Insurance Value-Added Network Service (IVANS) sponsored by many of the major "American Agency" property/casualty companies that utilize independent (as opposed to tied) agents, as shown in Exhibit V-4.
 - IVANS, which is in early implementation, links individual company systems to major mini- and micro-based turnkey systems in agents' offices. Without IVANS, every company would have to install its own proprietary terminal in an agent's office.
 - IVANS promises to reduce these terminal-related expenses by an order of magnitude and generally makes these "American Agency" companies more competitive with the "direct writers" (Allstate, State Farm, etc.).

EXHIBIT V-4
INSURANCE VALUE-ADDED NETWORK
(Institute for Insurance Research)



- The "central switch" functions are the key to success, as shown in Exhibit V-5. After fierce competition they were contracted to IBM (Information Network) for implementation. The jury is still out on the extent to which IVANS will be a success:
 - Technically, this is a very demanding project since there are several hundred major interfaces (i.e., perhaps 30 major companies multiplied by eight turnkeys) and tens of thousands of potentially changing company interfaces (i.e., 10 to 20 major policy types multiplied by associated data elements for each policy type). In addition, industry agreement on standards in particular areas (e.g., batch data transfer) has not yet been reached.
 - Politically, some of the largest companies are not giving IVANS positive support and are still pushing their proprietary networks and interfaces. These companies view their pioneering agency interfaces as competitive weapons that they will not lightly relinquish.
- However, the real importance and controversy surrounding IVANS has masked even more critical systems issues affecting individual insurance companies.
 - IVANS is important from the standpoint of improving distribution effectiveness and reducing distribution costs.
 - However, improved administrative support systems within insurance companies would have an even greater impact on costs and are essential for ensuring product profitability and differentiation. IVANS used by itself actually increases the risk that property/casualty products of individual companies will become increasingly homogenized.
- Exhibit V-6 shows the IVANS activities in relation to the other functions that go on within an insurance company. Important as IVANS may be, it represents

EXHIBIT V-5

INSURANCE VALUE-ADDED NETWORK COMPONENTS

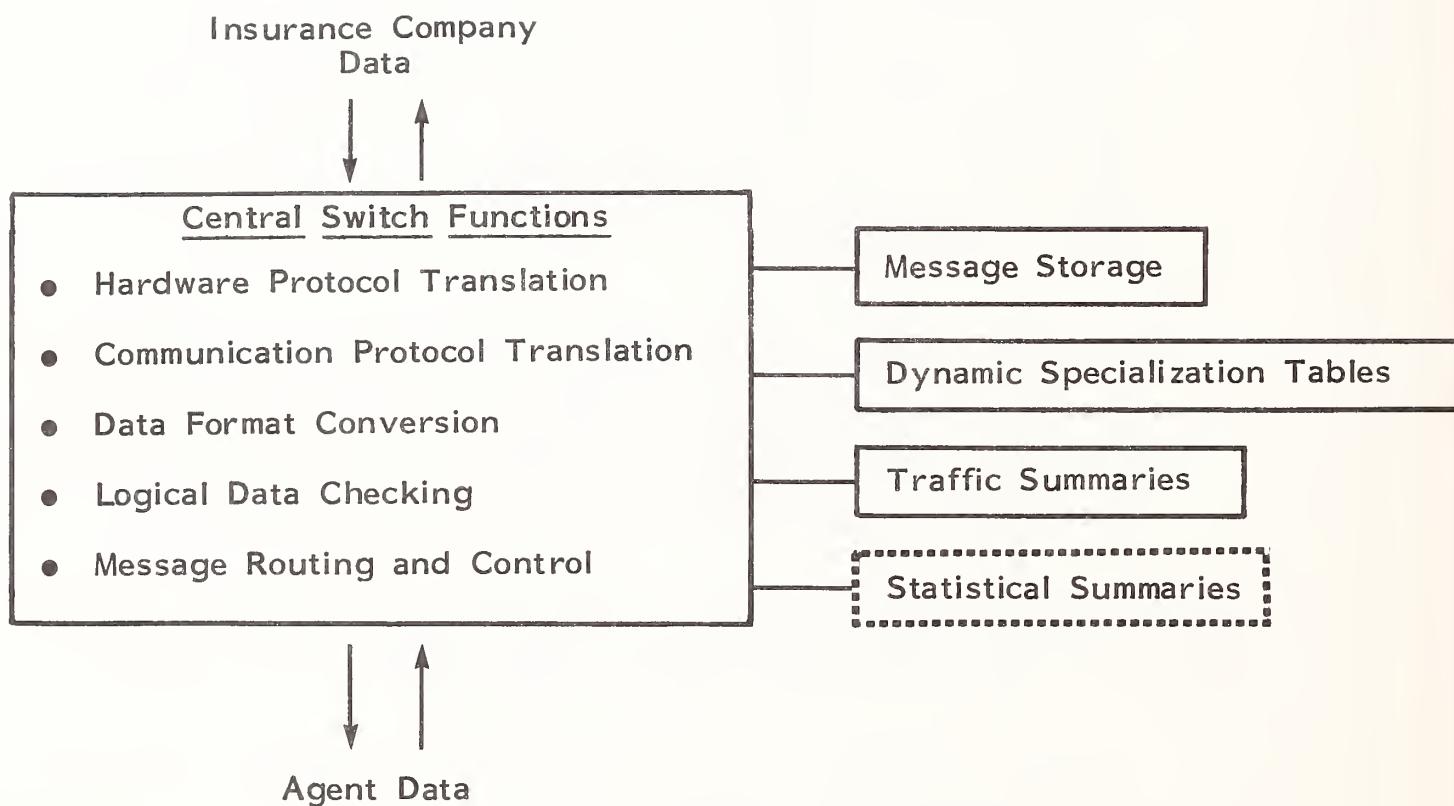
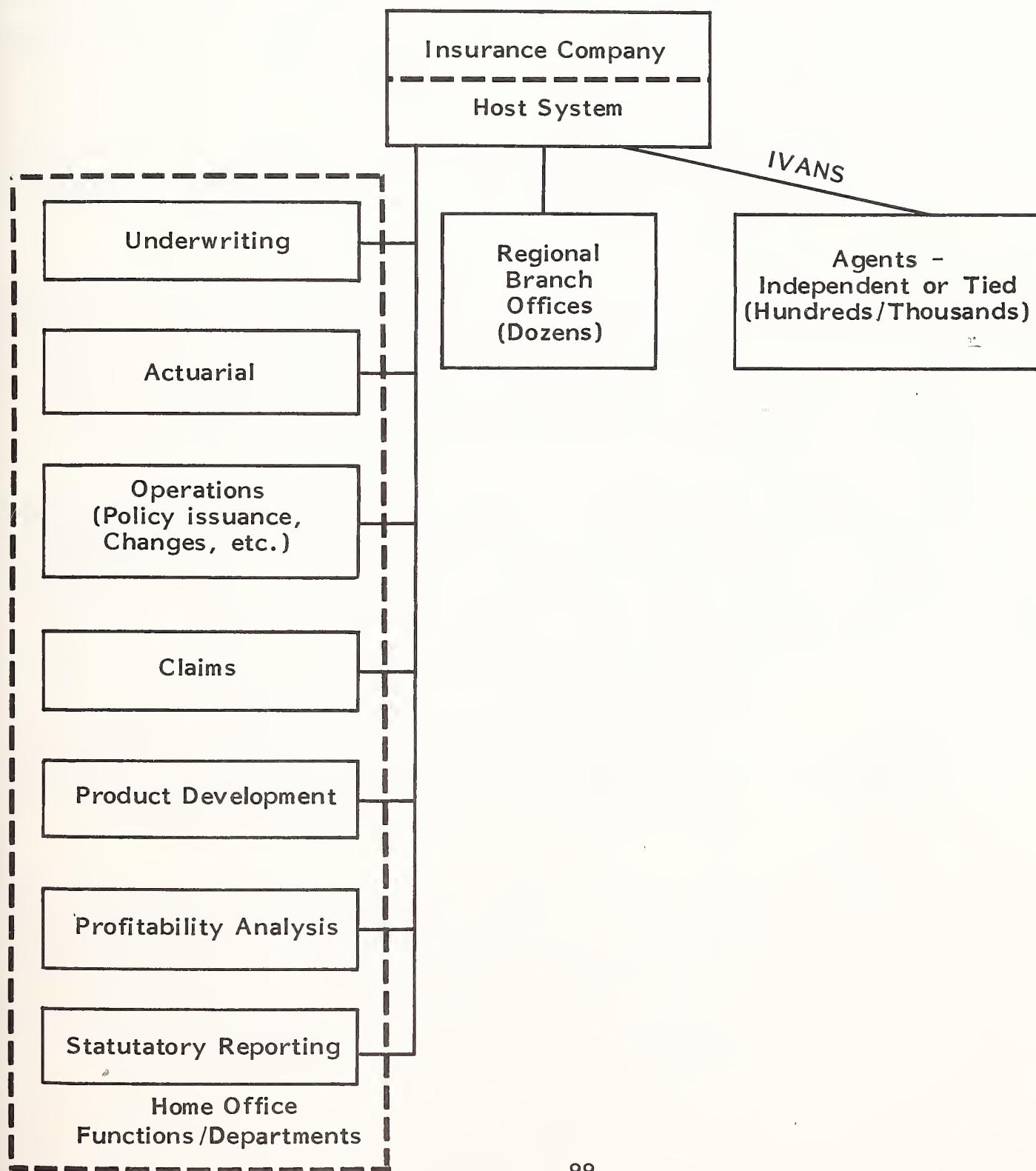


EXHIBIT V-6

PROPERTY/CASUALTY INSURANCE

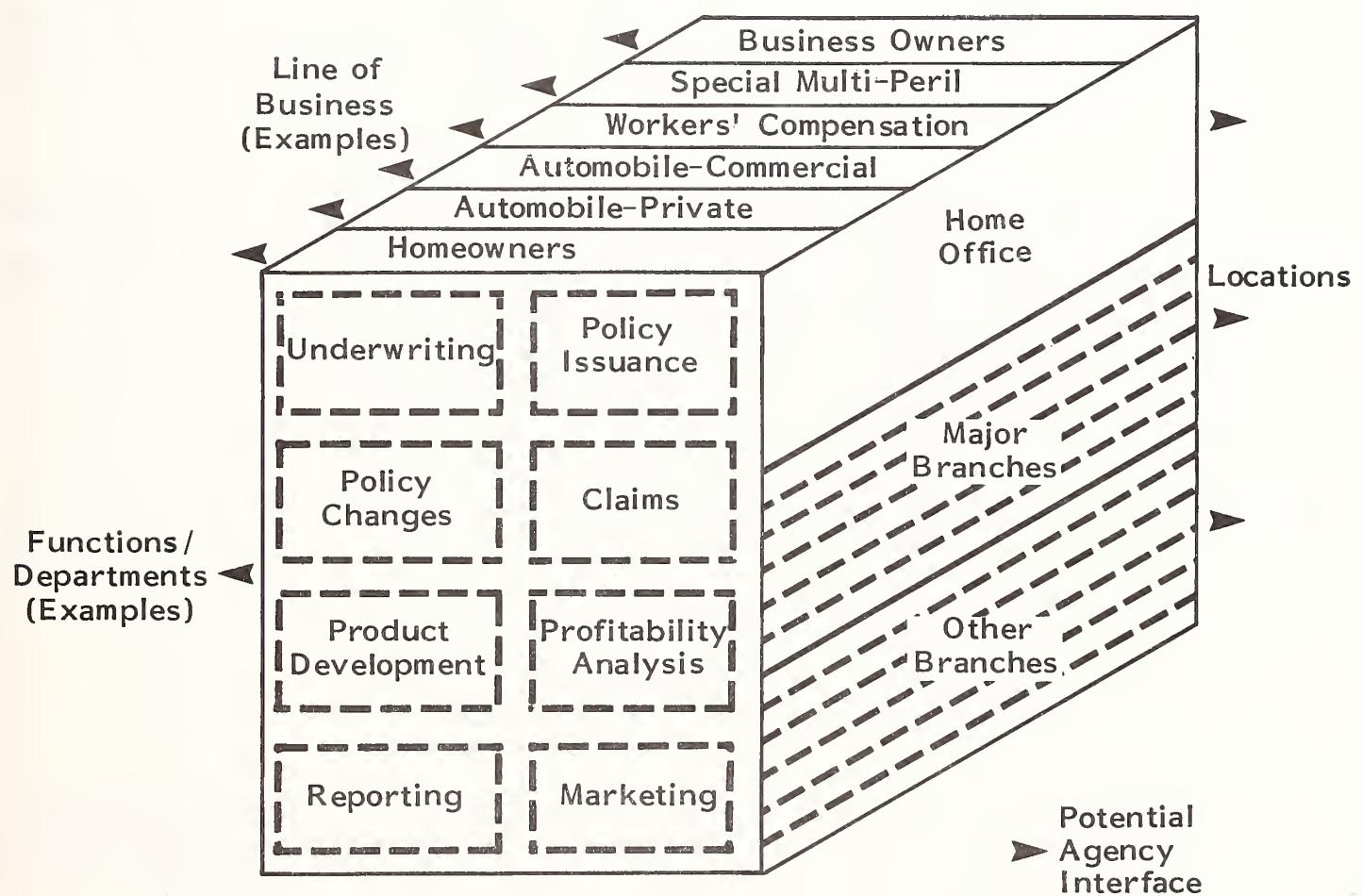


perhaps only 20% of cost-avoidance opportunities for most companies and an even smaller proportion of the opportunities for product profitability and differentiation.

- These internal systems have traditionally been large-host-based systems. PMS is the premier supplier of specialized software for such internal systems; many other such systems have been developed by companies internally. Turnkey and RCS products have never made significant headway in the internal system market.
- Recently, however, there has been an increasing realization among many insurance companies that the host-based systems have neared a dead end.
 - The development cycle (and associated backlog), even using packaged software, is long and getting longer. This is increasingly unsupportable for product line managers who are under increasing pressure to produce innovative products quickly.
 - The complexity inherent in fully automated systems is enormous. The functional/department areas vary by line of business, as shown in Exhibit V-7. Increasingly, automation is being controlled and managed by line of business. These functional/line-of-business distinctions are sometimes also carried down into the branches as a result of decentralization or as part of efforts to provide better customer service. Potential agency interfaces may occur at multiple (and changing) parts of the organization, as shown by the arrowheads in Exhibit V-7.
 - This complexity makes the system all but inaccessible to user staff; few, if any, of the IS staff fully comprehended the entire system or how different parts interact. These systems tend to be rigid and unable to cope with the architectural changes needed to react to changing business conditions.

EXHIBIT V-7

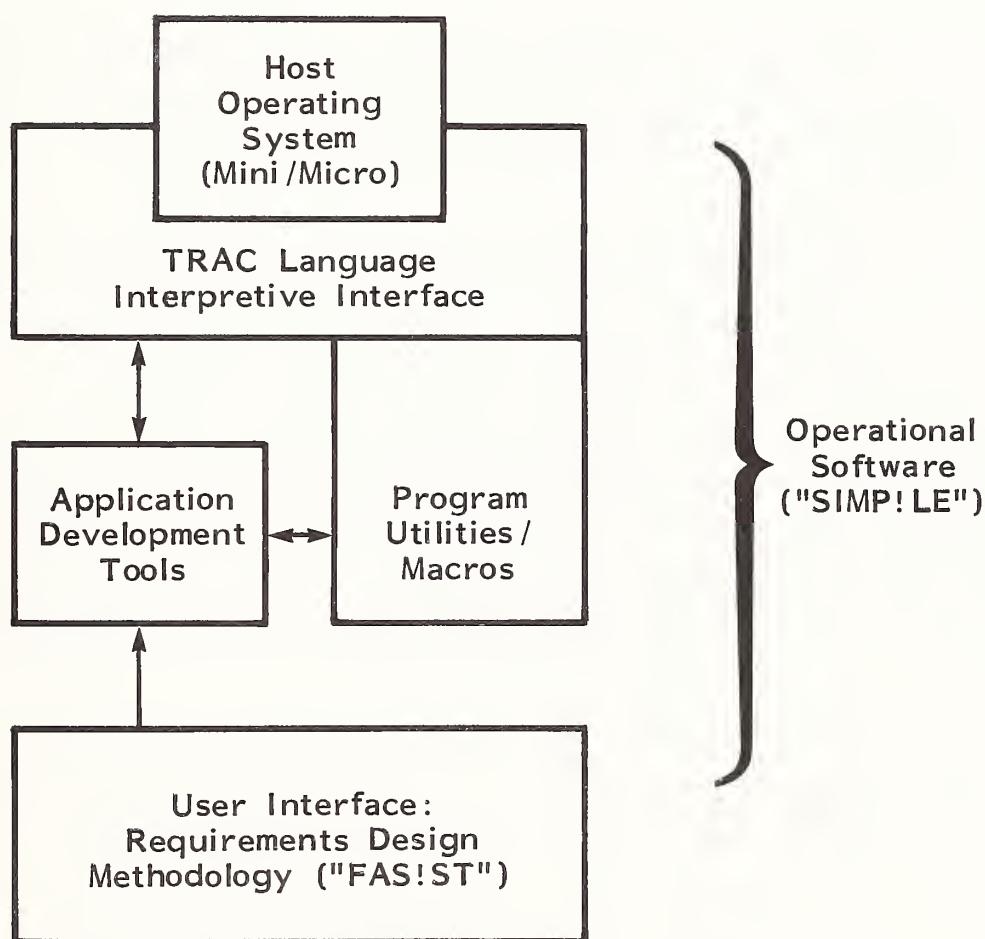
PROPERTY/CASUALTY COMPANY ORGANIZATIONAL RELATIONSHIPS



- Because of this, users and IS staff in some property/casualty companies have become receptive to some kind of dispersed processing that would uncouple at least some processing functions from the host.
- However, no such complete product currently exists. What does exist as a partial solution to this problem is an interesting product, the Data Conveyor, from a small firm, Data Concepts, Inc. The Data Conveyor is a unique, proprietary product aimed at transaction-intensive operations. It is available as software or as a tailored turnkey system. The insurance industry was targeted several years ago because of the background of some of Data Concepts' senior staff.
- The Data Conveyor system, as shown in Exhibit V-8, is made up of a collection of unique software modules whose qualities make it especially suited for administrative processing. These attributes are:
 - Text handling.
 - Interactive, real-time.
 - Internal data management.
 - Transportable.
- On the other hand, it is not very suited to applications involving considerable mathematical operations nor does it have user query/decision support facilities associated with fourth-generation languages.
- Its various features make it suited to put complex administrative processing systems on micros. Its key features, attested to by many users, are:

EXHIBIT V-8

DATA CONVEYOR OVERVIEW



- The ability for true end users to become involved in (or even control) system design and implementation.
- The ability to tailor existing building blocks into truly company- and application-specific systems in very short periods of time; i.e., typically weeks or months compared to the equivalent years in host-based systems. Note that this lengthy host-based time requirement is true for both custom systems and tailored mainframe packages.
- It is coincidence that the Data Concepts approach has only taken off as micros have placed powerful functionality in department-sized (and priced) packages.
 - Data Concepts has managed to turn the usual turnkey hardware/software price ratios (discussed earlier in the chapter) upside down:
 - Most mini-based software is viewed by vendors and customers alike as a relatively small part of the entire package.
 - However, the Data Concepts software and installation is priced at least five times that of the underlying hardware.
 - In part, Data Concepts is fortunate that PMS has erected what is, in effect, a price umbrella over other property/casualty software.
 - A medium-sized PMS customer can expect to pay \$500,000 or up for software, plus installation and mandatory 25% maintenance.
 - Fees can go much higher since PMS is very unusually placed in being able to apply software fees in proportion to customer revenue and growth.

- When Data Concepts software is converted to run on the micro/XT, it may have the "honor" of having the most expensive software offered for the XT. At the same time, it will also have a customer base that has seen its offerings as one of the best buys available.
- The most significant fact of the Data Conveyor's success is that it has been accepted in the face of what might normally be viewed as drawbacks, i.e.:
 - No linkage to corporate data bases.
 - Lack of built-in data base manipulation.
 - Proprietary development and processing software.
 - Installation and support from a relatively small company.
- However, what the Data Conveyor has offered to users is a very powerful argument in favor of virtually unconnected micros and mainframes (although a tighter micro/mainframe connection would certainly be preferred by many users). This turnkey solution provides for:
 - True modularity (i.e., individual functions by line of business) that mirrors the way insurance companies actually work--much better than the "components" of host systems (which are often so tightly coupled so as not to be modules at all).
 - Fast development and great flexibility.
 - User involvement (or control, if desired) in development and maintenance; functional experts can put exactly what they want into the application without having to use a technical expert as a translator.

- Perhaps most importantly, users can exercise as much control as they wish, including having all software and hardware under their physical control.
- As Data Conveyor systems have been implemented, the obvious problems caused by the lack of a mainframe data base have become clearer. Interim solutions have been devised.
 - Users have developed their own interfaces, using fourth-generation languages, for example, as analytic and reporting tools.
 - The vendor, Data Concepts, has planned links to established mainframe data base systems.
- These types of solutions are suboptimal or interim. They do not address the long-term need of segmented applications that have host- and micro-based programs and files that have been carefully designed to work together.
- It is only fair to point out the vendor, Data Concepts, has recently gone into receivership. Although there are typically multiple reasons for this, it is useful for other vendors to understand some of the product and marketing reasons.
 - In proportion to its size, Data Concepts had a very large development and maintenance effort:
 - A self-contained software environment means more support overhead.
 - New application areas were being developed.
 - Difficult mainframe and corporate data base areas were being addressed.

- The proportion of true "turnkeyness" versus consulting may have been underestimated. Software developers, for both economic and philosophical reasons, like to think in terms of modules. Data Concepts had the additional insight that flexibility within modules was also required (boxes within boxes).
 - However, even where the modules approach is objectively true and can meet customer needs, often the customers don't appreciate this and need more (expensive) hand-holding.
 - Company needs, even within the same regulated industry, can produce different technical requirements; i.e., new modules would be needed.
 - Going into the environment with a turnkey attitude (at turnkey-- i.e., fixed--pricing) can be very expensive if assumptions do not turn out as expected.
- As so often happens, Data Concepts' very success (e.g., 600% increase in staff in two years) made it more exposed to these kinds of problems.

C. DISTRIBUTED TURNKEYS: THE XT/370 AND AFTER

- At first glance, the phrase "distributed turnkey" appears to be a contradiction in terms: turnkeys are self-contained, while distributed systems nodes are integrated in a usually unique application environment. However, the XT/370 promises potentially to unite these two dissimilar approaches into an attractive market opportunity.

- In principle and concept, this approach allows users to have their cake and eat it too:
 - The "mainframe" is brought to the desktop.
 - The user has control of VM/CMS.
 - The whole library of VM software, both systems software and applications software, is available for immediate use. These can include quite heavy duty applications.
 - Within VM's Pass Through facility, XT/370 users can potentially link into many other VM systems.
- However, on closer inspection the XT/370, as it exists today, suffers from profound limitations:
 - The XT/370 is not, in fact, a standalone machine. Current chips do not provide good memory management.
 - While CMS is on the XT/370, VM itself still must reside on the host.
 - As new chips are available with much better memory management (like the 286 or 386), then it could become possible to have a self-contained XT/370.
 - Similarly, coping with VM/CMS takes up most of the power and space in the XT/370.
 - There is little room left for applications. Where applications have been put on the XT/370 experimentally (or, much worse, with expectations of selling the result), performance was found to be quite marginal and not feasible.

- However, the XT/370 does have sufficient resources to serve the purpose outlined for it in IBM's initial announcement--a programmer's workstation. Functioning in this manner, the XT/370 is often not overloaded and can provide predictable and usually acceptable response time.
- Apart from technical limitations (which, after all, can be solved by applying more resources) there is the larger issue of whether host-developed applications should be (or, in some cases, can be) put on a desktop.
 - "User friendly" is an overworked word, but one that should be taken seriously when considering placing micro-based applications in user hands. One of the mounting criticisms of host-based systems generally is that they are difficult to:
 - Learn.
 - Use.
 - Adapt.
 - Control.
 - Moving such unchanged applications out of the protective environment of the data professing professional and onto the desktop helps neither the end user, the information systems department, nor, ultimately, the vendor.
 - Host-oriented applications are, by their nature, not susceptible to minor "tweaking" to make them suddenly user friendly.

- . Most host applications assume large data bases, intricate processing logic, and a web of supporting systems software. Response time is something that is spread out between many dozens, if not thousands, of users.
 - . This maps poorly against the micro's strengths of having considerable amounts of processing power focused on relatively small amounts of data in order to provide exceptional response.
- A considerable number of organizations (corporations as well as vendors) do not fully appreciate these factors.
 - Several corporations INPUT interviewed plan to use XT/370s in application settings.
 - Two mainframe applications vendors have planned to place parts of their mainframe product onto the XT/370 as a way to get an "instant" micro product, as opposed to Information Builders, which rewrote FOCUS for the IBM PC. One of these attempts has already run into serious problems because of the capacity problems described above.
- However, as first mentioned, the concept of the XT/370 fills many of the requirements for a true micro/mainframe system, i.e.:
 - High power.
 - Host connectivity (i.e., VM Pass Through).
 - Shared operating system environment.
 - Data sharing.
 - Potentially, application and applications program segmentation.

- The promise of the XT/370 concept will be seen in later generations (the XT/3000?) that will have the capacity to do larger amounts of useful (i.e., applications) work. However, that will only be the first step.
 - Equally, if not more important, will be to think through how applications logic and data should be distributed throughout the nodal network.
 - When this is done, it will represent a successful implementation of the early efforts of RCS companies to distribute pieces of their applications onto micros.
 - Information Center activities would be a logical initial candidate, since solutions would be generalizable and under the control of IS.
 - Applications segmentation would have to be approached much more carefully because of the increased time, expense, and coordination involved.
- INPUT is convinced that XT/370-type machines will have, potentially, an enormous impact on both software and turnkey vendors. However, this is an opportunity that is two to four years away:
 - The technical foundation is not here yet.
 - Corporations are lukewarm now and will not be much warmer in the near term, as seen in Exhibit V-9.
 - Overall, vendors show a similar fairly low level of interest.
- Even without the current emphasis on M-M links, an XT/370-linked product would be useful in some areas, since the attraction of reusable code would be strong. However, the emerging M-M environment will place special emphasis on the qualities of an "XT/3000":

EXHIBIT V-9

FUTURE IMPORTANCE OF XT/370 TO SELECTED GROUPS

Company Respondents*

Average

2.3

Planning New Micro-Mainframe Applications

2.9

Vendor Assessment of Importance to Companies

Now

2.6

1986

3.3

Low

2

3

4

5
High

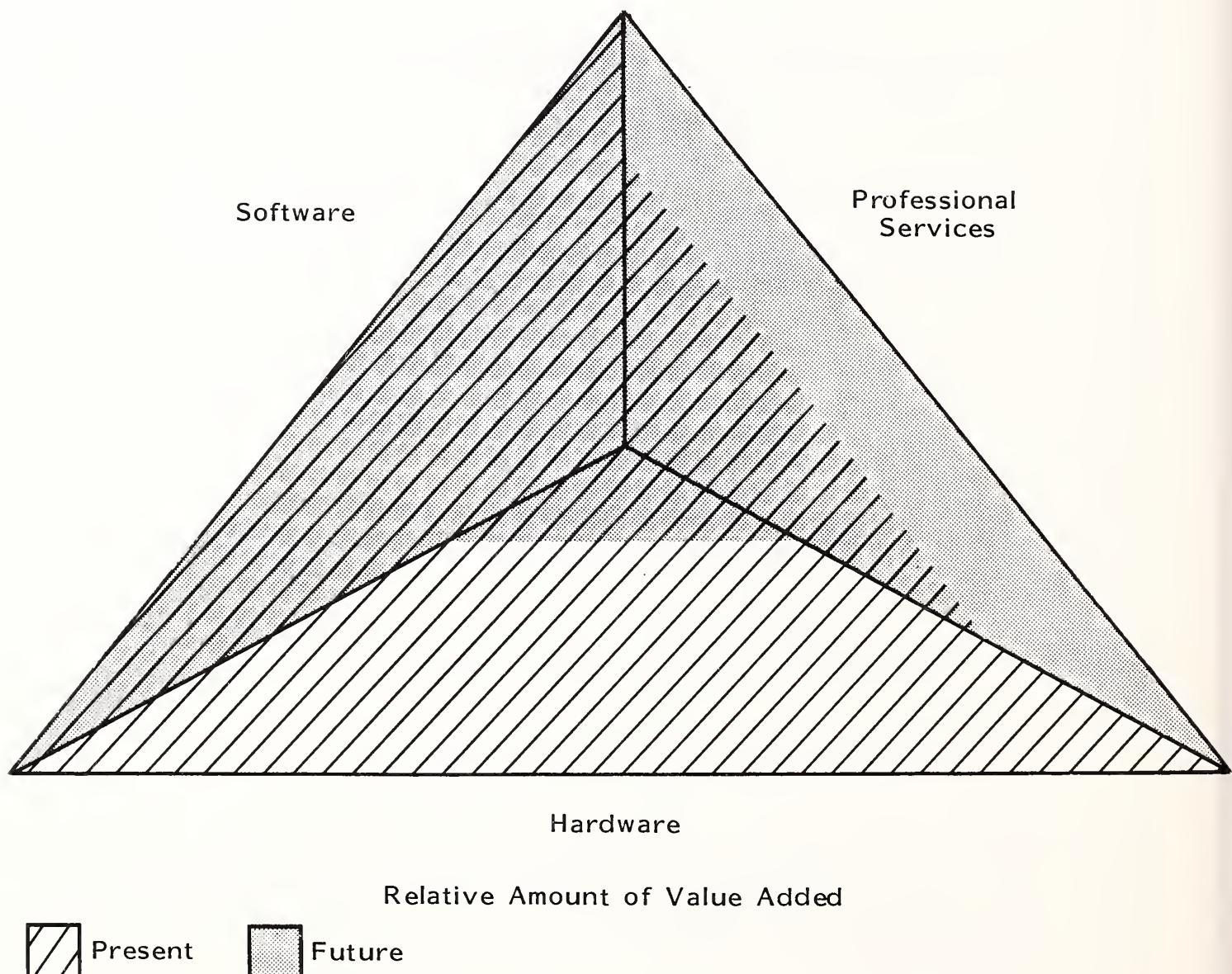
Importance of XT/370

* Future Use

- Much of the M-M compatibility problem will be solved, reasonably painlessly.
 - There will be a de facto architectural standard for turnkey hardware.
- An XT/370 world will be a different kind of world for established turnkey vendors, however.
 - The value added by hardware selection and integration will be greatly reduced.
 - The "turnkey" system will be much less self-contained and consequently in many ways not strictly speaking a turnkey; i.e., it would be a turnkey locally and a distributed processor from a corporate standpoint.
 - The interfaces, both inside and outside of the enterprise, may be quite complex (see Chapter IV for an analysis of these interface issues, from an RCS standpoint).
- The result is that the kinds of value added by a turnkey vendor will change:
 - The professional service component will increase and the hardware component will decrease, relatively speaking.
 - Exhibit V-10 illustrates these changes graphically.
- Software will continue to be the driving force in the "new turnkey" environment. The professional services component will change considerably from its (much smaller) current constituents, i.e.,
 - Systems analysis and design (for interfaces).

EXHIBIT V-10

RELATIVE PROPORTION OF VALUE ADDED IN TURNKEY COMPONENTS:
PRESENT AND FUTURE (SCHEMATIC)



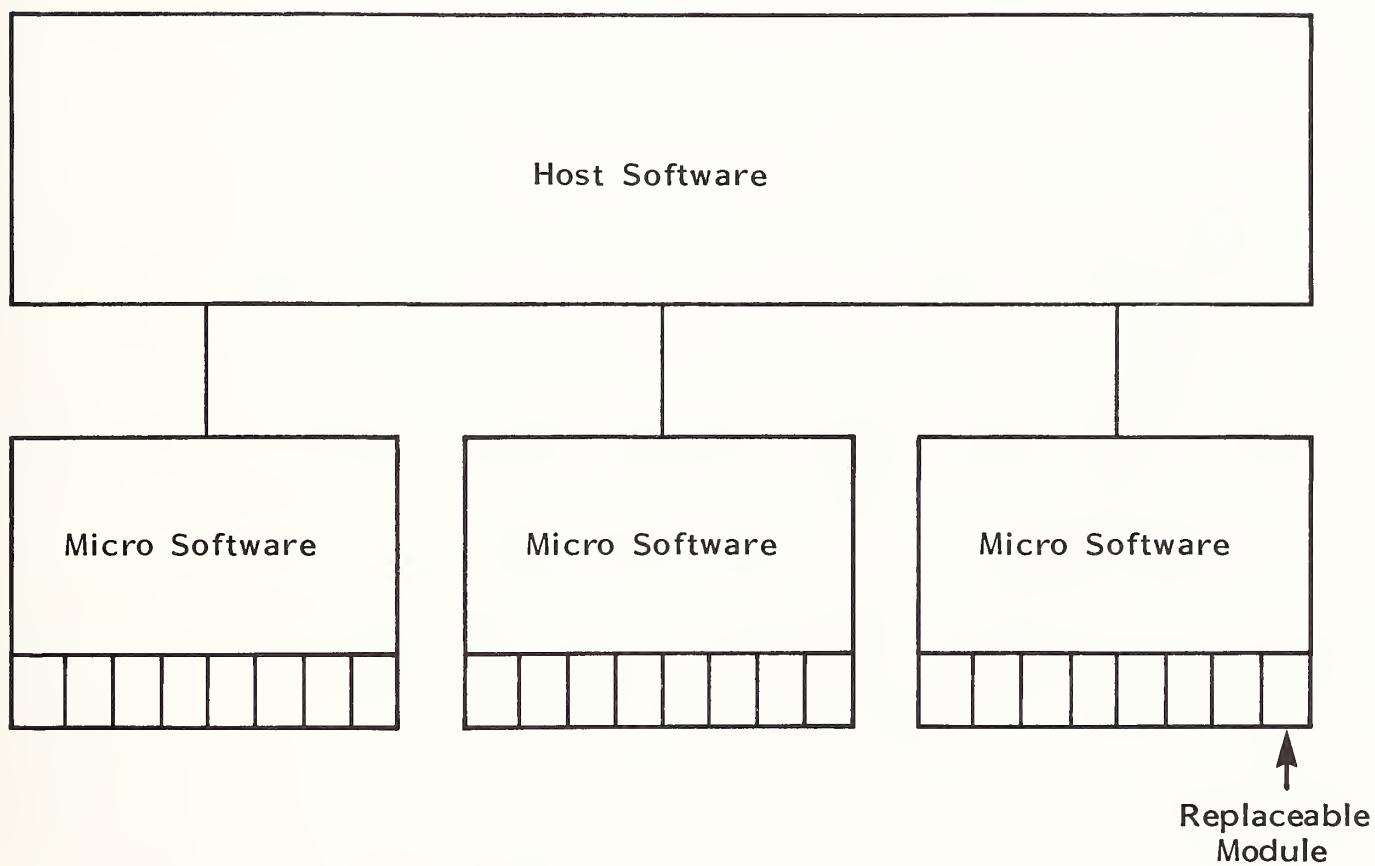
- Communication design (for mainframe links).
- Software modification (here the Data Concepts approach should be useful).
- It is these professional service components that will prevent the turnkey sector from becoming just software.
 - It is the familiarity and acceptance of the professional service component that will give turnkey vendors an advantage over the packaged software vendors, who are certain to be targeting this market.
 - Providing professional service has always made the software vendors uncomfortable. They view the people involved as representing a loss of resources from their core business of developing and supporting software. Consequently, in a self-fulfilling prophecy, customer support staff is often not top quality.
 - Software vendors also object to customers modifying their software. This is also a somewhat circular, but strongly held, position:
 - . Virtually all mainframe software has been designed with very limited modification in mind. The concept of "snap-in" modules is still foreign to most vendors.
 - . There is no conceptual framework for making major modifications. Consequently those that are made are often done badly, reinforcing opinion that this is a bad alternative.
 - . To make matters worse, major modifications reduce interest in obtaining standard vendor software maintenance.

D. ANALYSIS OF TURNKEY OPPORTUNITIES

- What is now a fairly cohesive turnkey product target will disaggregate under pressures (positive and negative) from the micro.
 - The traditional full-service turnkey business for customers with revenues over \$25 million will remain; as noted, the hardware component will shrink. Customers will have to be educated as to the value of the package of services.
 - However, the pressure from well-executed vertical-market micro software packages will be unremitting and traditional vendors will slowly have to give ground. Thus pressure will be accentuated by IBM's continuing support for VARs and VADs.
 - A related new niche is providing turnkey systems with flexible functionality. This will be attractive to companies of Fortune 1000 size (and divisions of large Fortune-sized companies) with similar needs requiring tailored solutions. As these products develop, they too, will place pressure on the traditional turnkey market.
 - Distributed turnkey system will require more hardware and software capacities than exist now. The hardware problem will be easiest to solve, since it basically involves evolutionary improvements to the XT/370.
- The distributed turnkey software problems will be much more difficult to solve since they will require both new code and new concepts.
 - Not only will application functions need to be divided between micro and mainframe, but at the micro level the flexible functionality of replaceable modules will be demanded by users, as shown in Exhibit V-11.

EXHIBIT V-11

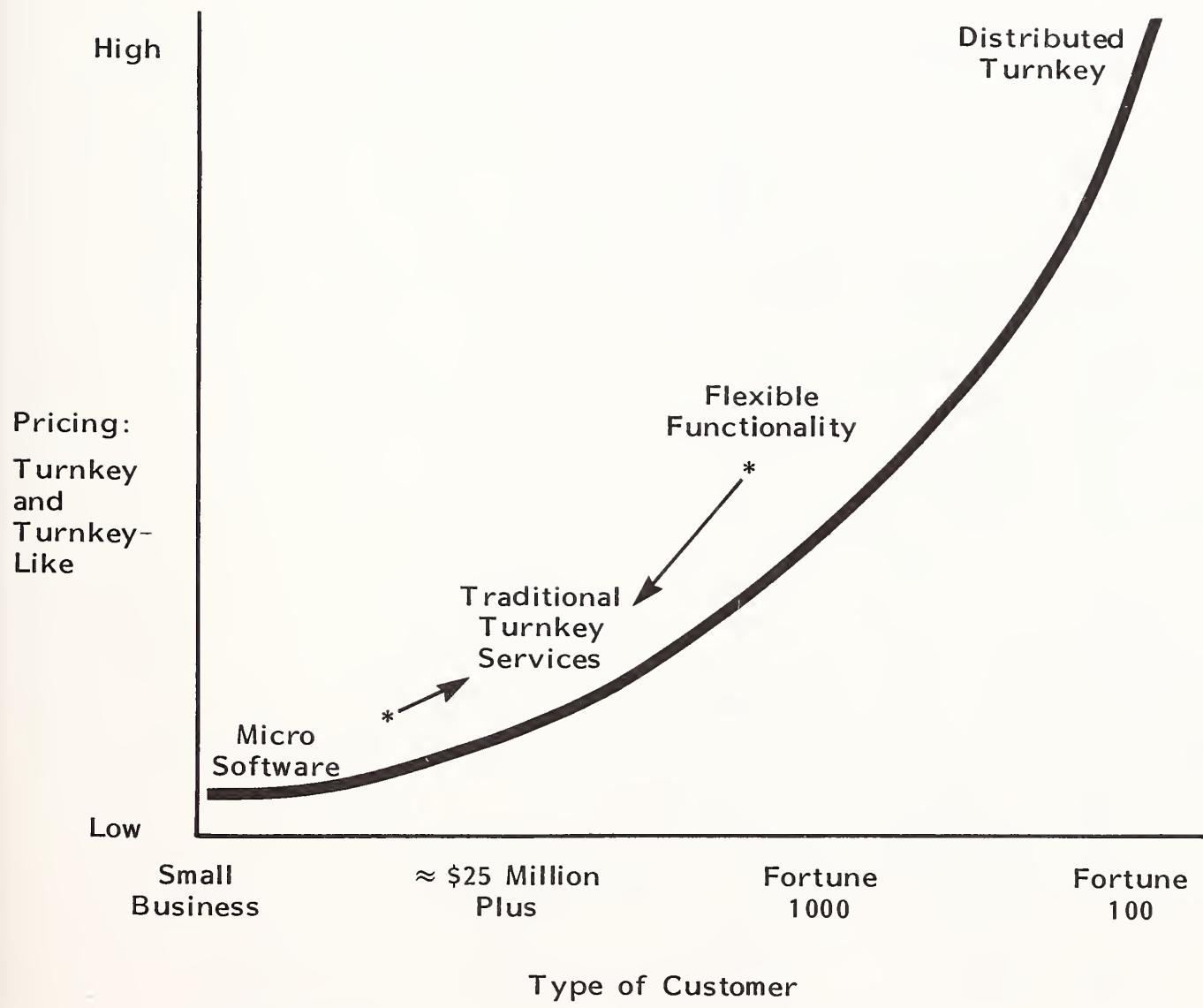
DISTRIBUTED TURNKEY SOFTWARE



- This will be a very difficult design task, but very rewarding to those that solve it.
- Exhibit V-12 shows in schematic form the relationships between these four evolving types of turnkey and "turnkey-like" products.

EXHIBIT V-12

TURNKEY PRODUCT AND PRICING APPROACHES



VI COMPETITIVE ENVIRONMENT

VI COMPETITIVE ENVIRONMENT

A. GENERAL

- From a competitive standpoint, the situation is "good news, bad news."
 - The good news is that:
 - There are no dominant vendors yet.
 - There is room for a considerable amount of differing technical approaches.
 - IBM will provide market definition.
 - Users are receptive to vendor assistance.
 - On the other hand,
 - There are many blind product alleys that vendors can end up in.
 - There are markets that, eventually, most established and many new vendors will be attempting to enter.
 - IBM will be increasingly asserting itself.
 - Users are puzzled as to what kinds of vendors can help them.

- At this stage of M-M development, the competitive forces of concern to RCS and turnkey firms are not those of their familiar competitors, but the software sector in general.
- A less obvious but perhaps more dangerous barrier to competition is usually unconscious desires to remain true to historical ways of doing business. Software vendors, not RCS and turnkey vendors, have the luxury of making this choice.

B. USER EXPECTATIONS

- Users expect considerable assistance from vendors in constructing M-M applications.
 - Exhibit VI-1 shows that vendors are already involved in over two-thirds of M-M applications.
 - This rises to four-fifths for projects in the concept or planning stage, as shown in Exhibit VI-2.
 - This percent of vendor involvement is two to three times that normally found in new system development, especially in larger corporations.
- The kinds of vendor participation used or expected runs the gamut of vendor products and services, including:
 - Design and analysis.
 - Programming.
 - Software products.

EXHIBIT VI-1

IN-HOUSE AND VENDOR INVOLVEMENT IN
MICRO-MAINFRAME APPLICATIONS DEVELOPMENT

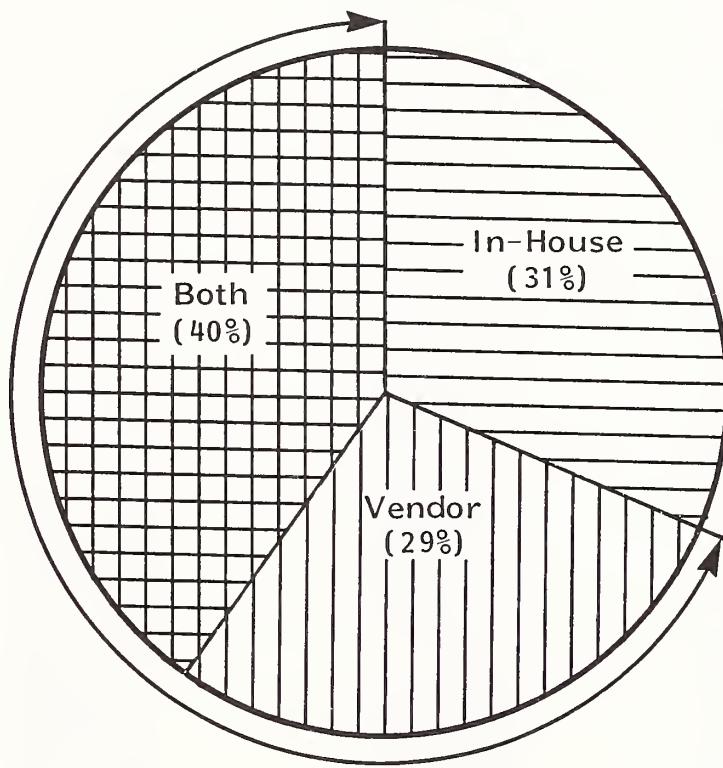
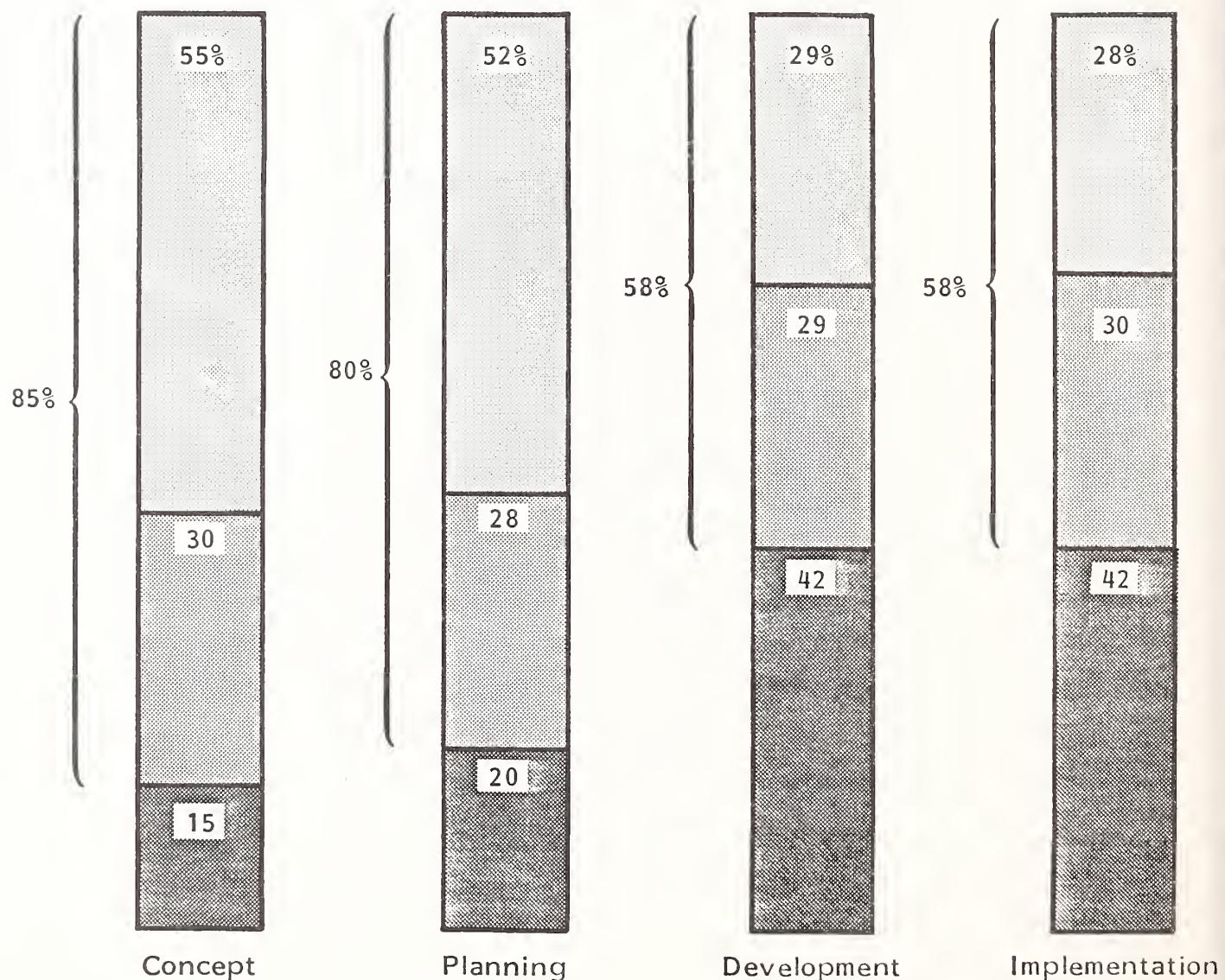


EXHIBIT VI-2

VENDOR PARTICIPATION IN
MICRO-MAINFRAME APPLICATIONS DEVELOPMENT



Source of Development

- Both
- Vendor
- In-House

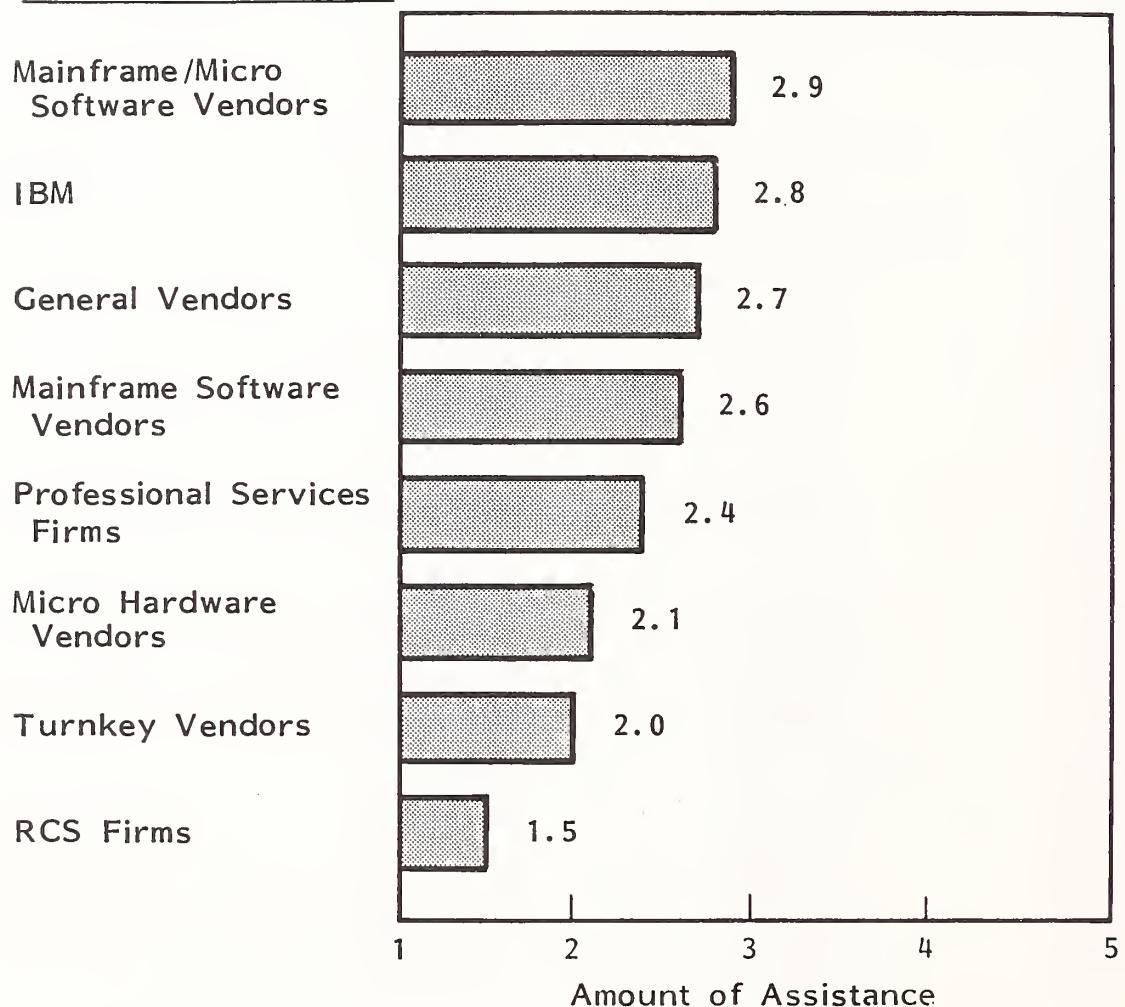
X% { = Vendor Participation Percent

- Software product modification.
 - Original vendor.
 - Third party.
- A significant problem from the standpoint of vendors is that customers have a very limited understanding of vendor offerings and capabilities.
 - This came out in corporate interviews, where respondents were asked to rate the amount of assistance they expected from different sources. Details are in Exhibit VI-3.
 - Even the highest rated source did not reach three on a scale of five.
 - RCS and turnkey firms received the lowest ratings.
 - These generally low ratings seem paradoxical in light of the high amount of vendor assistance used now and expected in the future. It is not a matter of lack of satisfaction so much as it is a lack of knowledge.
 - Among other things, the names of so-called micro-mainframe products have tended to cancel out, in spite or because of extensive advertising and publicity.
 - Those that have looked further have typically found that most vendor products do not meet their (or perhaps anyone's) requirements.

EXHIBIT VI-3

ASSISTANCE EXPECTED FROM VENDORS IN
PLANNING/IMPLEMENTING MICRO-MAINFRAME APPLICATIONS

POTENTIAL SOURCE
OF ASSISTANCE



Rating:

- 1 = No Assistance Expected
- 5 = Much Assistance Expected

- In INPUT's observation, at this stage that corporate customers tend to find a particular vendor and stick with this vendor through the learning process.
- The low ratings for RCS and turnkey vendors reflects the fact that these classes of vendors have been among the least active in the M-M area so far.
 - A ray of light in the gloom is that activist companies (i.e., those using vendor micro software now or favoring interactive M-M applications) are open to considering most vendors, including RCS and turnkey vendors, as shown in Exhibit VI-4 and VI-5.
 - However, there is no question that RCS and turnkey vendors will have to win their spurs in a very competitive environment.

C. IBM

- IBM has done the entire information services industry a considerable service by establishing so many de facto micro standards so early. This will prevent many of the blind alleys and incompatibilities that occurred in other market areas as they were getting under way.
- Since IBM is not a charitable institution, the price that RCS and turnkey vendors pay for this (in advance) is:
 - IBM Information Network commitment to distributed M-M processing. However, IVANS may consume considerable resources for some time and provide an inadvertent window for competitors.
 - IBM or IBM-sponsored LANs as the M-M local linkage.

EXHIBIT VI-4

VENDOR ASSISTANCE EXPECTED FROM HIGH-NEED GROUPS (From RCS Firms)

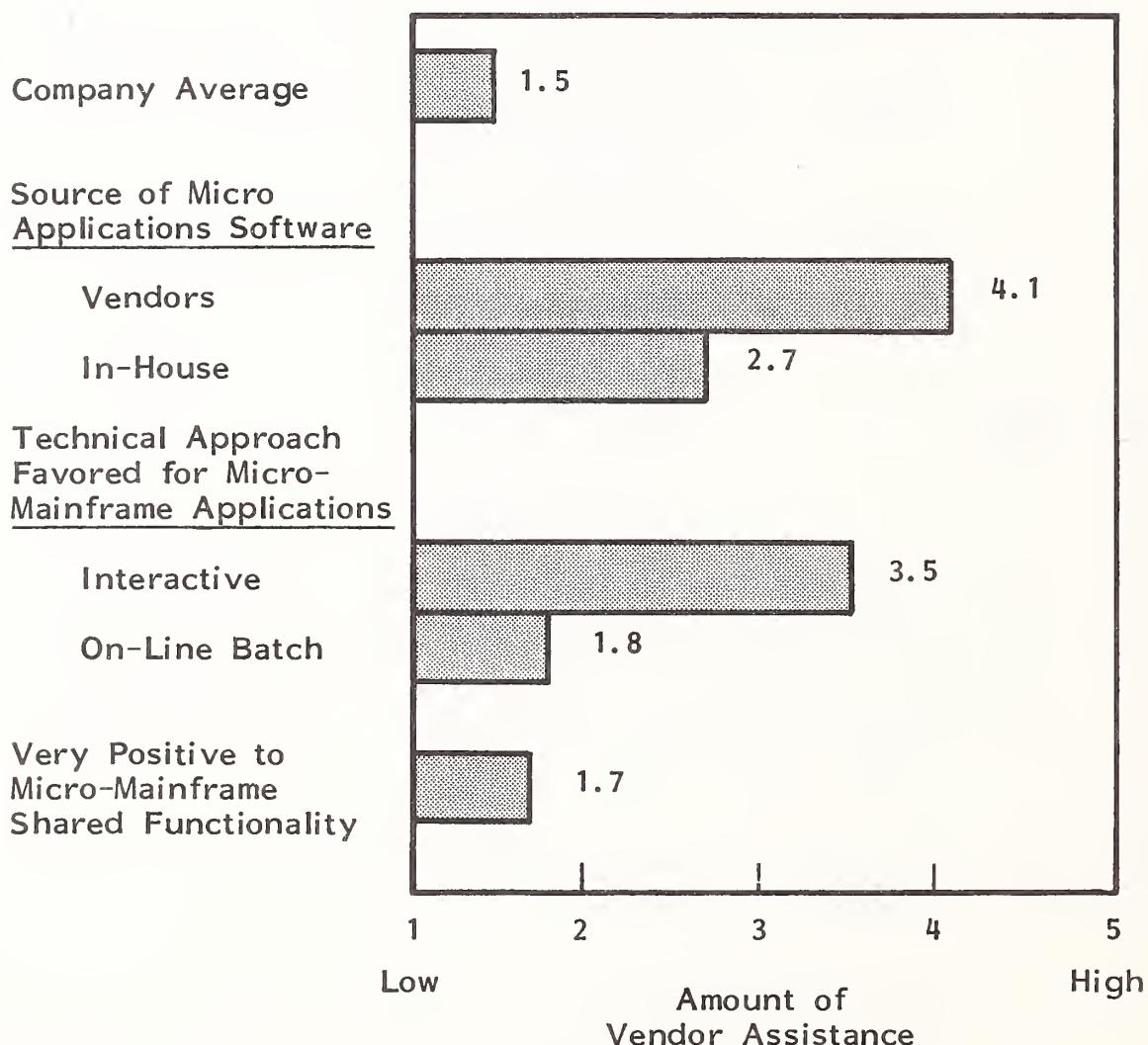
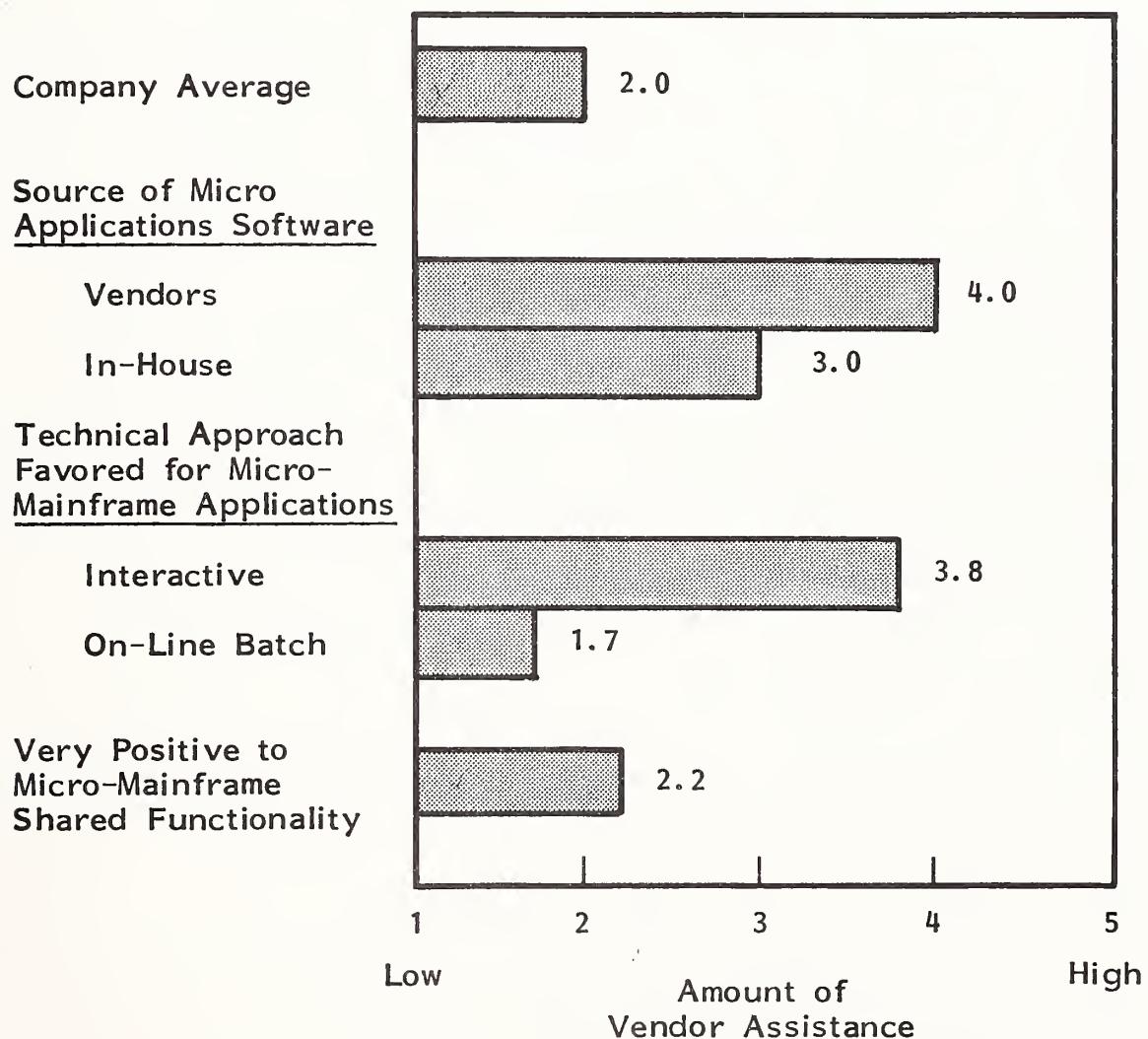


EXHIBIT VI-5

VENDOR ASSISTANCE EXPECTED FROM HIGH-NEED GROUPS (From Turnkey Companies)



- Micro-based software as the predominant product delivery mode to small business, with IBM targeting some direct sales of software to this group.
- The XT/370 and follow-ons as potential "fighting machines" to reserve new market areas for their own exploitation.

VII CONCLUSIONS AND RECOMMENDATIONS

VII CONCLUSIONS AND RECOMMENDATIONS

- Recommendations have been made at the appropriate points in this report. This chapter will summarize them (and provide references back to the detailed discussion of the specific issue where appropriate).
- The most important thing for both RCS and turnkey vendors to remember is that while this is a new, uncertain world for all vendors (see Section III, C), it is especially so for them: software vendors have an edge that must be overcome (Section VI).
- Several technically oriented issues are very important:
 - The micro end of M-M should be viewed as a computer in its own right and not as a "super terminal."
 - The IBM PC family is the standard (Section III, A); deviations should be made only for extraordinarily good reasons (Section I).
 - True interactive M-M applications should be avoided in the immediate future until key technical solutions have been found (Section III, A).
 - Data communications, especially electronic mail, will grow faster as a result of M-M applications (Section III, B).

- End users and IS management will both be key decision points for M-M applications (Section III, A).
 - Turnkey and RCS firms must learn to deal with IS departments.
 - This is especially important given the very low visibility that RCS and turnkey firms have as purveyors of M-M solutions (Section VI).
 - However, vendors should be extremely careful not to overpromise or announce "vaporware," since the marketplace is becoming quite cynical concerning M-M puffery (Section VI).
- Connectivity will be the key opportunity. M-M application connections will be both important and complex (Section III, C); corporations know they will need vendor help (Section VI).
 - RCS firms' principal opportunities will be in supplying applications-based connectivity between diverse companies; an industry focus will usually be required (Section IV).
 - Turnkey vendors will be forced to move upmarket because of the micro pressure on low-level products (Section V).
 - In the short term, turnkey systems with more flexible functionality can enable firms to get more value from software and professional services.
 - Long term, distributed turnkey systems with an industry focus will provide opportunities.

APPENDIX A: USER QUESTIONNAIRE

MICRO-MAINFRAME USER QUESTIONNAIRE

INPUT is conducting a study on the issues involved in linking microcomputer host systems and data. We will make recommendations on how corporations can best deal with these issues in the coming years. We would like your organization to take part in this study by describing what you are doing now, what your plans are and what problems you see. This information will be used by IS departments in their planning and will also be used by a wide variety of information service vendors to offer more useful products and services.

None of the information that you provide will be associated with your company. In return for your taking part in this study, we will send you a summary of this study on its completion and will also send you a summary of INPUT's report, PC Software Support in Large Corporations.

1. How many personal computers are in use within your company? (If no PCs are used or planned by the end of 1985, end interview.)

	Now	End of 1984	End of 1985
Total all types	_____	_____	_____
IBM PC XT/370 or 3270/PC	_____	_____	_____
IBM PC except XT/370 or 3270/PC and IBM PC SW/data-compatible types	_____	_____	_____
UNIX-based systems	_____	_____	_____
Other personal computer types	_____	_____	_____
(Total should equal sum of parts)	_____	_____	_____

2a. How will the UNIX-based systems be used? _____

2b. In the future, how important do you see UNIX-based systems being to your organization's plans? (1 = low importance, 5 = high importance)

UNIX-based systems _____

Why? _____

3a. In the long run, how important do you see the XT/370 in your organization's plans? (1 = low importance, 5 = high importance)

XT/370 _____

Why? _____

The 3270/PC? _____

Why? _____

3b. How well would you rate your organization's current understanding of the capabilities of the XT/370 and the 3270/PC? (1 = low degree of understanding, 5 = high degree of understanding)

XT/370 _____ 3270/PC _____

Please give me some examples of particular areas where your organization requires additional information on the capabilities of the XT/370 and the 3270/PC. (PROMPT AS NECESSARY: for example, what has to be done to permit current applications software to run on the XT/370, how will concurrent data bases be handled, etc.)

XT/370 _____

3270/PC _____

4a. How many multiuser microcomputer systems (e.g., Altos) and local area networks (LANs) do you now have installed? Who are the vendors? What are these systems being used for?

Multiuser Micros

LAN

Number of installations _____

Vendors _____

Applications/Uses _____

4b. How many multiuser micros and local area networks do you expect to have installed in two years? What new uses will you have?

	Multiuser Micros	LANs
Number of installations	_____	_____
Vendors	_____	_____
Applications/Uses	_____	_____

5. In the future, what will the relative importance be to your organization of the following kinds of microcomputers? (1 = low importance, 5 = high importance) Why? (READ EACH ITEM BELOW)

	Rating	Reason Why
Standalone personal computers running personal computer software? (e.g., IBM PC/XT)	_____	_____
Standalone personal computers running mainframe software?	_____	_____
Personal computers in local area networks?	_____	_____
Mainframe terminals that also have personal computer capabilities (e.g., 3270/PC)	_____	_____

6. On a scale of 1 to 5 with 1 representing low importance and 5 representing high importance, how would you rate the following functional areas? In two years how would your importance rating change for these? Why the change?

	<u>Now</u>	<u>Two Years</u>	<u>Reason for Change</u>
Spreadsheet packages using local data	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
Spreadsheet packages using downloaded data	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
Vendor application packages for PCs	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
In-house developed programs for PCs (including fourth generation languages)	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

7a. The next set of questions relate to so-called micro-mainframe application systems. For the purposes of this study, we are defining this to mean the following: "Applications in which neither the mainframe host nor a microcomputer can fully carry out an activity without utilizing processing capabilities or data from the other." Do you agree with this definition?

Yes No

7b. If no, please tell me how you would modify it: _____

8. With +5 representing agreement and -5 representing disagreement, to what extent do you agree that "Within three to five years most applications that are now host-based will have a considerable amount of functionality taken over by personal computers that are linked to the host."

Why? _____

9. Do you believe that links between host computers and micros will be predominantly interactive, predominately on-line batch, or about the same? (READ DEFINITION IF NEEDED)

DEFINITION: ON-LINE BATCH - where the micro performs processing on a ~~standalone~~ basis and, periodically, the personal computer and the host exchange data; the host may then further process the data received.

Predominantly interactive
 Predominantly on-line batch
 About the same

Reason why _____

10. In constructing micro-mainframe systems how common do you think each of the following approaches will be? (READ LIST BELOW) Why? (1 = very common, 5 = not common) NOTE: ALL OPTIONS MAY BE RATED "NOT COMMON" OR "VERY COMMON" - OPTIONS ARE NOT MUTUALLY EXCLUSIVE.

Rating

Reason Why

Modification of existing software _____

Use existing data base but
write new application code _____

Write entirely new applications _____

11a. Generally, to what extent do you see data base linkage and synchronization as a serious problem in establishing micro-mainframe links? (1 = not a problem, 5 = a serious problem) _____

11b. How serious is this problem for systems used for analysis? (e.g., spreadsheets) _____

Why? _____

11c. How serious is this problem for production systems? (e.g., order entry, payroll) _____

Why? _____

11d. What can an organization like yours do to solve these kinds of data base linkage and synchronization problems?

12a. Do you see backup and security as significant barriers to expanded use of linked micro-mainframe applications?

Yes

No

If no, skip to question 13.

12b. What are the major problems that you see? _____

12c. What can an organization like yours do to solve these problems?

12d. What solutions can vendors provide? _____

13a. For your own organization, what specific applications do you see as being the most suitable as micro-mainframe applications? (They need not be computerized applications now.) (Use workspace below.)

13b. Are these applications planned and if so, at what stage are you in implementing them (i.e., do not have concrete plans, are in the planning stage, applications are being developed, applications are already implemented)? (Use workspace below.)

13c. Do you expect to develop these applications in-house, purchase an existing package from an outside vendor, or modify in-house an existing package? (Use workspace below.)

Application Name	Stage				Source		
	None	Plan	Dev.	Imp.	In-house	Vendor	Both
1.							
2.							
3.							
4.							
5.							

Comments:

1. _____
2. _____
3. _____
4. _____
5. _____

14a. Do you have electronic mail? Yes No
If no, skip to question 15.

14b. How many users currently use the electronic mail now? In two years?

Now _____ Total in two years _____

14c. On the average, how many messages are now sent via electronic mail per month? In two years?

Now _____ Total in two years _____

14d. What percentage of this change in electronic mail use do you expect to be attributable to microcomputers? _____ %

15a. In what ways do you see micro-mainframe applications increasing your data communications requirements?

15b. In what ways do you see micro-mainframe applications decreasing your data communications requirements?

15c. Overall, do you think that the net effect will be to increase or decrease your data communications requirements? By what percent?

Increase: _____ % Decrease: _____ % No effect: _____

16a. With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with micros in other departments?

Why? _____

16b. What type of communication facility will your firm be likely to use for this type of communication? (Use matrix on following page.)

17a. With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with mainframes in other companies (i.e., suppliers, customer)?

Why? _____

17b. What types of communication facilities will your firm be likely to use for this type of communication? (Use workspace on following page.)

18a. With 1 representing low importance and 5 representing high importance, how important will it be for your company's micros to communicate with public data bases? _____

Why? _____

18b. What types of communication facilities will your firm be likely to use for this type of communication? (Use workspace below.)

Type of Communication Facility	Micros in Other Departments	Mainframes in Other Companies	Public Data Bases
LAN			
Existing network			
Leased lines			
WATS			
Dial up			
Public data network			
Other			

19a. Do you expect your company's micros to be linked to more than one type of mainframe (e.g., IBM and DEC)? Yes No
If no, skip to question 20.

19b. What would be the most common types of mainframe linkages?

19c. Would, typically, the same micro have to link to more than one kind of mainframe at different times? Yes No

20a. Do you expect that your company's micros will have to be linked to more than one type teleprocessing environment (e.g., to both TSO and CMS, or to CICS and IMS DC)? Yes No

If yes:

20b. Which ones? _____

20c. Would, typically the same micro have to link to more than one kind of software environment at different times? Yes No

21a. Do you expect that your company's micros will be linked to more than one type of data base management system (e.g., to both IMS and IDMS)? Yes No

If yes:

21b. Which ones? _____

21c. Would, typically, the same micro have to link to more than one kind of DBMS at different times? Yes No

22a. Do you expect microcomputer use in your company to accelerate the use of relational data base systems in your company? Yes No

If no, skip to question 23.

22b. Which one? _____

22c. Would this data base be located on a regular mainframe or have a special machine devoted to it? IF SPECIAL MACHINE: Which one?

23a. With 1 representing no assistance and 5 representing much assistance, how much assistance generally do you expect to be able to get from vendors in helping with planning and implementing your organization's critical micro-mainframe applications? _____

23b. More specifically, how would you rate:

<u>Vendor Type</u>	<u>Rating</u>	<u>Reason Why</u>
--------------------	---------------	-------------------

Microcomputer hardware vendors _____

IBM _____

Software vendors who primarily offer mainframe software _____

Software vendors who offer both mainframe and microcomputer software _____

Remote processing (timesharing) vendors (e.g., McAfee, Boeing Computer Services) _____

Integrated systems (turnkey) vendors _____

Professional services and consulting firms _____

24. What current problems do you see micro-mainframe systems solving or alleviating?

25a. What problems do you see being created or aggravated by micro-mainframe systems?

25b. How do you think these new problems should be dealt with?

THANK YOU.

APPENDIX B: CORPORATE RESPONDENT PROFILE

APPENDIX B: CORPORATE RESPONDENT PROFILE

- The 78 corporate respondents were from the following industrial sectors:
 - Process Manufacturing: 26.
 - Banking and Finance: 18.
 - Discrete Manufacturing: 16.
 - Services: 11.
 - Insurance: 7.
- Large corporations (i.e., revenues of over \$2 billion) accounted for 42 of the respondents. Smaller organizations (revenues between \$500 million and \$2 billion) had 36 of the respondents.
- As noted in the body of the report, there were generally few respondent differences that correlated with industry sector or company size.

APPENDIX C: VENDOR QUESTIONNAIRE

MICRO-MAINFRAME VENDOR QUESTIONNAIRE

INPUT is conducting a study on the issues involved in linking microcomputer host systems and data. We will make market forecasts on related products and services. We would like your organization to take part in this study by describing what you are doing now, what your plans are, and what problems you see. This information will be used by IS departments in their planning also.

None of the information that you provide will be associated with your company unless you wish otherwise. In return for your taking part in this study, we will send you a summary of this study on its completion and will also send you a summary of INPUT's report, PC Software Support in Large Corporations.

1. Which microcomputer hardware and software environments in the following list does your company expect to be important for micro-mainframe applications in 1984 and in 1986? (1 = low importance, 5 = high importance) Why?

	End of		<u>Reasons</u>
	<u>1984</u>	<u>1986</u>	
IBM PC AND PC/XT	—	—	_____
IBM XT/370	—	—	_____
IBM 3270/PC	—	—	_____
UNIX-based products	—	—	_____
Other micro hardware (describe)	—	—	_____
Other micro software (describe)	—	—	_____

2. What do you see as the major opportunity areas in connection with the XT/370 and the 3270/PC?

XT/370 _____

3270/PC _____

What do you see as limiting the growth in supplying software specifically aimed at the XT/370 and 3270/PC?

3. In the future, what will the relative importance be of the following kinds of microcomputers? (1 = low importance, 5 = high importance)
Why? (READ EACH ITEM BELOW)

Standalone personal computers running personal computer software? (e.g., IBM PC/XT)

Rating

Reason Why

Standalone personal computers
running mainframe software?
(e.g., XT/370)

Personal computers in local area networks?

Mainframe terminals that also have personal computer capabilities (e.g., 3270/PC)

4. On a scale of 1 to 5 with 1 representing low importance to corporate users and 5 representing high importance, how would you rate the following functional areas? In two years how would your importance rating change for these? Why the change?

Now

Two
Years

Reason for Change

Spreadsheet packages using local data

Spreadsheet packages using downloaded data

Vendor application packages for PCs

In-house developed
programs for PCs
(including fourth-
generation languages)

5. The next set of questions relates to so-called micro-mainframe application systems. For the purposes of this study, we are defining this to mean the following: "Applications in which neither the mainframe host nor a microcomputer can fully carry out an activity without utilizing processing capabilities or data from the other." Do you agree with this definition?

Yes No

If no, please tell how you would modify it: _____

6. With 1 representing agreement and 5 representing disagreement to what extent do you agree that "Within three to five years most applications that are now host-based will have a considerable amount of functionality taken over by personal computers that are linked to the host?" _____

Why? _____

7a. Do you believe that links between host computers and micros will be predominantly interactive, predominantly on-line batch, or about the same? (READ DEFINITION IF NEEDED)

DEFINITION: ON-LINE BATCH - where the micro performs processing on a standalone basis and, periodically, the personal computer and the host exchange data; the host may then further process the data received.

Predominantly interactive
 Predominantly on-line batch
 About the same

Reason why: _____

7b. How is your firm addressing this issue?

7c. How does this compare to other specific products?

8a. In constructing micro-mainframe systems how common do you think each of the following approaches will be? (READ LIST BELOW) Why? (1 = very common, 5 = not common) NOTE: ALL OPTIONS MAY BE RATED "NOT COMMON" OR "VERY COMMON" - OPTIONS ARE NOT MUTUALLY EXCLUSIVE.

	<u>Rating</u>	<u>Reason Why</u>
Modification of existing software	—	—————

Use existing data base but write new application code

—————	—————
-------	-------

Write entirely new applications

—————	—————
-------	-------

8b. How is your firm addressing this issue? _____

—————

8c. How does this compare to other specific products? _____

—————

9a. Generally, to what extent do you see data base linkage and synchronization as a serious problem in establishing micro-mainframe links? (1 = not a problem, 5 = a serious problem)

—————

9b. How serious is this problem for systems used for analysis (e.g., spreadsheets)? _____

—————

Why? _____

—————

9c. How serious is this problem for production systems (e.g., order entry, payroll)? _____

—————

Why? _____

—————

9d. What do you see as the general solution to this problem? _____

—————

9e. How are you addressing it? _____

10a. Do you see backup and security as significant barriers to expanded use of linked micro-mainframe applications?

Yes No If no, skip to question 13.

What are the major problems that you see? _____

10b. What do you see as the general solutions to these problems?

10c. How are you addressing it? _____

11a. What specific applications do you see as being the most suitable as micro-mainframe applications? (They need not be computerized applications now.) (Use workspace below.)

11b. Are products for these applications planned, and, if so, at what stage are you in implementing them (i.e., do not have concrete plans, are in the planning stage, applications are being developed, applications are already implemented)? (Use workspace below.)

11c. Do you expect users to develop these applications in-house, purchase an existing package from an outside vendor, or modify in-house an existing package? (Use workspace below.)

Application Name	Stage				Source		
	None	Plan	Dev.	Imp.	In-house	Vendor	Both
1.							
2.							
3.							
4.							
5.							

Comments:

1. _____
2. _____
3. _____
4. _____
5. _____

12a. In what ways do you see micro-mainframe applications increasing data communications requirements?

12b. In what ways do you see micro-mainframe applications decreasing data communications requirements?

12c. Overall, do you think the net effect will be to increase or decrease data communications requirements? By what percent?

Increase: _____ % Decrease: _____ % No effect: _____ %

13a. With 1 representing low importance and 5 representing high importance, how important will it be for a company's micros to communicate with micros in other departments? _____

Why? _____

13b. What type of communication facility will a firm be likely to use for this type of communication? (Use workspace below.)

14a. With 1 representing low importance and 5 representing high importance, how important will it be for a company's micros to communicate with mainframes in other companies (i.e., suppliers, customer)? _____

Why? _____

14b. What types of communication facilities will a firm be likely to use for this type of communication? (Use workspace below.)

15a. With 1 representing low importance and 5 representing high importance, how important will it be for a company's micros to communicate with public data bases? _____

Why? _____

15b. What types of communication facilities will a firm be likely to use for this type of communication? (Use workspace below.)

Type of Communication Facility	Micros in Other Departments	Mainframes in Other Companies	Public Data Bases
LAN			
Existing network			
Leased lines			
WATS			
Dial up			
Public data network			
Other			

16a. Do you expect a company's micros to be linked to more than one type of mainframe (e.g., IBM and DEC)?

Yes No If no, skip to question 17.

16b. What would be the most common types of mainframe linkages?

16c. Would, typically, the same micro have to link to more than one kind of manframe at different times?

Yes No

16d. Which of your products will facilitate this?

17a. Do you expect that a company's micros will be linked to more than one type teleprocessing environment (e.g., to both TSO and CMS, or to CICS and IMS DC)?

Yes No If yes:

17b. Which ones?

17c. Would, typically, the same micro have to link to more than one kind of software environment at different times?

Yes No

17d. Which of your products will facilitate this?

18a. Do you expect that a company's micros will be linked to more than one type of data base management system (e.g., to both IMS and IDMS)?

Yes No If yes:

18b. Which ones?

18c. Would, typically, the same micro have to link to more than one kind of DBMS at different times?

Yes No

18d. Which of your products will facilitate this?

19a. Do you expect microcomputer use in a company to accelerate the use of relational data base systems in a company?

Yes No If no, skip to question 20.

19b. Which one? _____

19c. Would this data base be located on a regular mainframe or have a special machine devoted to it? IF SPECIAL MACHINE: Which one?

19d. Which of your products will facilitate this?

20a. What other products have you introduced or planned to introduce that will address micro-mainframe issues?

20b. What functions will they perform?

20c. What hardware and software environments will they function in?

20d. When will they be available?

20e. What competitive products will they most closely compete with?
What will distinguish your product from the competition?

21. What current problems do you see micro-mainframe systems solving or alleviating?

22. What problems do you see being created or aggravated by micro-mainframe systems?

23. How do you think these new problems should be dealt with?

24. Can you provide technical descriptive material about the products discussed?

Yes No

APPENDIX D: FORECAST METHODOLOGY

APPENDIX D: FORECAST METHODOLOGY

A. BACKGROUND AND ASSUMPTIONS

I. 1983 PENETRATION

- Ninety-five percent of respondents already have M-M applications.
 - They average approximately three applications per company, i.e., about 0.5% of all applications.
 - Many of these are small, almost trivial, analytic downloading applications.
 - However, many are ambitious, operations-oriented applications.
- Vendor participation in these types of applications is high (over 50%). Even more striking is expected vendor participation of over 80% for applications in the pipeline (concept or planning).
- Because this vendor participation rate is over twice as high as the average, the 1983 M-M share of the information services market is approximately 1% to 1.5%.
 - The low range is 0.5%.
 - The high range is 1.5%.

2. PLANS OF COMPANIES

- The single most striking result of the M-M survey was that over three-quarters of companies interviewed expected that most applications that are now host-based will have a considerable amount of their functionality taken over by microcomputers in three to five years.
- This faction, the three-quarters of companies that are positive toward the M-M principle, is composed of three groups of approximately equal sizes and representing three stages of acceptance:
 - The early innovators, who are very sure that the M-M approach is correct. Most of these are already starting to act.
 - The followers, who are somewhat less sure. This group has plans they will put in motion (although less aggressively than the innovators).
 - The wait-and-sees, who are positive in principle but will proceed more cautiously.
- The remaining quarter are somewhat doubtful of the M-M principle and/or would not expect to see most of their applications become M-M in the medium term.
- Although virtually all companies are experimenting with M-M applications, for projection purposes it is useful to view the four types of companies as successively phasing into M-M applications.
 - Group one, the early innovators, is assumed to have already started.
 - The other three groups will phase in every one-and-a-half years (high assumption) or two years (low assumption).

- Similar assumptions can also be made regarding:
 - The percentage of a company's "application portfolio" that will be made up of M-M applications.
 - The period of time it will take to reach this "steady state."
- Although respondents probably do in fact intend most applications to be of an M-M type, it is very hard for them to state precise systems plans more than about two years in the future. Hence, INPUT believes that a steady-state micro-mainframe percentage of the application portfolio would be 50-65%.
- Companies will reach this steady-state position before the eight years that is the normal life for an application.
 - Respondents agreed with the range of three to five years.
 - INPUT believes that the outer portion of the range is more realistic and has assigned five years as the high-end assumption and six years as the low-end assumption.

3. INDUSTRY SEGMENT FACTORS

- Industry sectors do not by themselves appear to be a strong segmenting force. Discrete manufacturing companies appear to be somewhat more aggressive in their M-M orientation and somewhat less so in process manufacturing. But in both cases they are not significantly more aggressive than other industry groups.
- The position of individual firms, departments, and even small groups of people appears to be at least as important as a driving force, particularly in the initial stages of M-M development.

- There is little question, though, that a successful M-M strategy should be industry and application focused.

4. SERVICE DELIVERY MODES

- Micro-mainframe services will be made up, at least initially, of the standard components of information services, i.e.:
 - Software.
 - Professional services.
 - Remote computing (including underlying communications transport and data base information delivery).
 - Integrated systems (which will undergo a change and not be the stand-alone systems they generally are now).
- INPUT's 1983-1988 information services figures are used as the base for each of the four delivery modes (with the integrated systems adjustment previously noted).
 - It is assumed that, at least in the medium term, the proportions of information services revenues claimed by the different modes would probably not change appreciably. (Or, to be more precise, there were equally good arguments for modes expanding or contracting as a result of M-M impacts.)
 - RCS was the most difficult case since traditional RCS growth is falling. Micro-mainframe services are well positioned to take up the slack and, depending on how communications transport is purchased, may even help revive growth.

5. CUSTOMER SIZE VARIABLES

- Micro-mainframe markets will, at least initially, not represent much of a divergence from the current situation.
 - Data processing expenditures (generally) and information services vendors expenditures (specifically) are related to overall corporate revenues. While smaller companies spend a larger proportion of their revenues than larger ones do (e.g., 1.25% versus 0.75% in discrete manufacturing), they are swamped in terms of absolute numbers and absolute opportunity.
 - INPUT's recent in-depth examination of three major sectors (manufacturing, banking, and insurance) indicates that similar types of needs--and willingness to use vendors--exist at all size levels.

6. SUMMARY OF ASSUMPTIONS IN A1-5: RANGES

<u>Factor</u>	<u>Effect on Forecast: Makes Forecast Lower/Higher</u>	
(1) 1983 micro-mainframe penetration	Lower	Higher
(2) Staging delay between four customer groups	2 years	1 1/2 years
(3) Micro-mainframe proportion of applications at a steady state	50%	65%
(4) Time to reach steady state	6 years	5 years

B. CALCULATION OF MICRO-MAINFRAME PROPORTION OF INFORMATION SERVICES

- In order to calculate low and high percentages, the "lower" and "higher" assumptions were each inserted into the following formula to produce the average increase per year until steady state was reached.

$$\frac{\text{Steady state percent (from 6.(3))}}{\text{Years in buildup (from 6.(4))}} = X$$

- This amount was divided by 4 to get an average percent increase for each of the four customer types described in section A2 of this Appendix. This percentage is 2.1% using low assumptions (50/6 divided by 4) and 3.25% using high assumptions (65/5 divided by 4).
- These percentages were applied to the fast and slow staging assumptions from A2 and are shown in Exhibits D-1 and D-2. (The percentages were substituted for X.)
- The cumulative M-M proportion of information services is shown in Exhibit D-3. These percentages have been applied to the appropriate INPUT forecasts. (Note: Where there is believed to be a potential for additional sector growth beyond previous INPUT estimates, this is the portion between the high and midpoint estimates.)

EXHIBIT D-1

MICRO-MAINFRAME MARKET SIZING WORKSHEET: 1½-YEAR STAGING
(Additional Percent of Expenditures)

CUSTOMER TYPE*	1984	1985	1986	1987	1988
1.	X	X	X	X	X
2.		0.5X	X	X	X
3.				X	X
4.					0.5X
Year Total	1X	1.5X	2X	3X	3.5X
Cumulative Total†	1X	2.5X	4X	7X	10.5X

* 1. "Early innovators" of micro/mainframe approach.
 2. "The followers."
 3. "The wait-and-sees."
 4. Doubtful of micro/mainframe approach.

† Add additional 1.5% for 1983 base.

X = Steady state percent
Years in buildup

EXHIBIT D-2

MICRO-MAINFRAME MARKET SIZING WORKSHEET: 2-YEAR STAGING
(Additional Percent of Expenditures)

CUSTOMER TYPE*	1984	1985	1986	1987	1988
1.	X	X	X	X	X
2.			X	X	X
3.					X
4.					
Year Total	1X	1X	2X	2X	3X
Cumulative Total†	1X	2X	4X	6X	9X

* 1. "Early innovators" of micro/mainframe approach.
 2. "The followers."
 3. "The wait-and-sees."
 4. Doubtful of micro/mainframe approach.

† Add additional 0.5% share for 1983 base.

X = Steady state percent
Years in buildup

EXHIBIT D-3

MICRO-MAINFRAME PROPORTION OF
INFORMATION SERVICES (Cumulative)

YEAR	PERCENT LOW	PERCENT MIDPOINT	PERCENT HIGH
1983	0.5%	1.0%	1.5%
1984	2.6	3.7	4.8
1985	4.7	7.2	9.6
1986	8.9	11.7	14.5
1987	13.1	18.7	24.3
1988	19.4	27.5	35.6

**APPENDIX E: MICRO-MAINFRAME IMPACT ON
PROFESSIONAL SERVICES**

EXHIBIT E-1

MICRO-MAINFRAME IMPACT ON PROFESSIONAL SERVICES
1984-1988

YEAR	TOTAL MODE FORECAST (a)	MICRO-MAINFRAME IMPACT (\$ Billions)		
		LOW	MIDPOINT	HIGH (b)
1984	\$ 8.1	\$0.2	\$0.3	\$0.4
1985	9.5	0.4	0.7	0.9
1986	11.2	1.0	1.3	1.6
1987	13.3	1.7	2.5	3.2
1988	15.7	3.0	4.3	5.6

NOTES: (a) = Total information services forecast for this mode from INPUT's 1983 annual report.

(b) = Difference between "midpoint" and "high" is potentially additive.

EXHIBIT E-2

MICRO-MAINFRAME IMPACT ON PROFESSIONAL SERVICES: FORECAST

